MODELS
FOR
DRAPING THE HUMAN FIGURE.

Henry Thampsen
September 1 – 1888.

MINERVA
Industry is revealing
the True,
the Good,
and the Beautiful.

MATHEMATICAL INSTRUCTION,
IN
Constructing Models,
FOR
DRAPING THE HUMAN FIGURE,

By

HENRY WAMPEN, PH. D.

Profeſsor of Mathematics.

London.

Sold by Meſs.rs Boone, Publishers and Booksellers;
26, New Bond Street.

MATHEMATICAL INSTRUCTION

IN

CONSTRUCTING MODELS

FOR

DRAPING THE HUMAN FIGURE.

BY

HENRY WAMPEN, PH.D.

PROFESSOR OF MATHEMATICS.

SECOND EDITION, WITH ADDITIONS AND IMPROVEMENTS.

London:
Sold by Messrs. BOONE, Publishers and Booksellers.
29, NEW BOND STREET.
1863.

PREFACE.

The present work upon mathematical instruction in constructing models for draping the human figure, is designed for all who are engaged in any manner with its external form either in shaping or adapting some article to it,—in a sanatory point of view as gymnastics &c.—or for those who have merely a mercantile aim; but it is especially designed for persons occupied in the fine arts and the industrial arts, æsthetically studying the draping or clothing of the human figure; and lastly, in the industrial sphere it is most particularly designed for that which is carried on by order; because in draping or clothing the human figure the æsthetical principle can only be fully and carefully developed, and presented in an external and visible form by the hand of a master in the fine arts, or by the hand of a master in an order industry. The sculptor, the painter, and the master tailor, are all in this point of view, if guided mentally by the æsthetical principle, equally artists. It may be borne in mind that a lay figure of wood, or, more preferable, a subject chosen as a lay figure in a painter's or sculptor's studio, is only for the one or the other of these artists, as the customer is in the model room of the artist who shapes and forms according to order in his industrial branch of occupation, models for clothing as required for the garments or drapery becoming to the figure of that customer. The æsthetical principle, or the idea of the beautiful in the minds of all the three artists conceptively flows or operates in the work of each, differing only in the material employed, but as drapery the same in kind. This æsthetical principle, if flowing equally high in the different pieces of art, whether giving drapery in painting, drapery in sculpture, or drapery on the living figure, makes the masters and their works in this respect stand on an equally high pedestal.

In comparing a draped with a nude figure, it will appearthat one beautiful in form and beautifully draped is far more enchanting than the nude of the same form, if only the artist has had regard so to drape the slender figure that when placed by the side of the nude they shall appear identical in their kinds of form. Or perhaps that it appears more beautiful, lies in the cause that a beautiful form beautifully draped, besides conveying modesty and innocence, as it always does in being nude, removes our mind from the otherwise too great distinctness of its being animal, and makes the intellectual and moral being more prominently brought out. If this is the case, then a figure beautiful as a nude would be equally so when draped; dismissing these additions, and permitting the mind to dwell purely on form, it may be true, especially when it is remembered that all drapery or clothing can be beautiful only when it is thought of in connection with the figure, and shaped and arranged suitably to its form. Drapery, disconnected, or independent of the figure is a mere mass. Such a mass shaped with the chance of finding a figure which it may become or not is void of the æsthetical principle altogether, and in this sense, the beautiful is completely nought. In respect to those fascinating charms which flow from the sentimental positions or actions, they are naturally the same in both figures—the beautiful nude, or that nude beautifully draped.

Considering the difficulty of dressing beautifully every kind of form presented by the human figure, we must dismiss from our minds all mercantile fashions, or look upon them as they mostly are, unnatural and monstrous, overloaded, shapeless masses, or sometimes in the opposite, scanty, poor, and distorted attempts. Such phenomena in dress in the mercantile world are merely its deep shadows falling on the figures of the vulgar and blind followers of the cry "Fashion," which although heartily avoided and disliked by persons of sound mind and appreciators of the beautiful in the form of dress, serve to make the truly naturally beautiful forms more distinct; similarly as vice revealed through the language and actions of one man, makes us comprehend and appreciate virtue conveyed by another.

A comparison of forms will bring us to a perception of the beautiful; but the conception of the beautiful according to the æsthetical principle, or to bring it to a visible representation according to the laws of that principle, can only be conveyed by science; but more of this hereafter. The difficulty, especially in modern drapery, appears to have been always great when the naturally beautiful was looked for. Watch, in a course of twenty years, different sculptors and painters in their studios, and for the same period different master tailors in the model room of an order firm with their customers. Read at last all the literary works to be procured, given to the world by thinking and reflecting men in the fine arts, and the industrial art of draping or clothing the human figure, then it will become clear how all have striven, and are striving, to get hold of some guide, some general rule to help them in the multitude of particular cases coming to their hand—cases in which they must and will infuse that which alone makes the drapery becoming to the figure. Science again steps in, and with its laws presents itself to the industrious and reflecting mind, and yet the best only embrace and apply it in composing and designing according to those scientific ideas, as if the generality of men were satisfied to idle on in a dim or half-consciousness, guessing in their work. Alive to this difficulty, Sir J. Reynolds says "the "art of disposing of the foldings of drapery makes a very considerable part of the painter's study;" further he says, "it requires the nicest judgment to dispose the drapery so that the folds shall "have an easy communication and gracefully follow each other with such natural negligence as "to look like the effect of chance, and at the same time show the figure under it to the utmost "advantage." Also Carl Marotti affirmed "the disposition of the drapery is a more difficult art "than even that of drawing the human figure;" that "a student may be more easily taught the "latter than the former, as the rules of drapery cannot be so well ascertained as those for "delineating a correct form of the human body." Similar allusions may be brought forward in great numbers, shewing that the art is not one to be slighted. After all then from what has been said, does it not appear that the masters of the fine arts, the masters of the industrial arts, and the scientific men keep themselves too confined and each isolated in his own sphere? If one thinks himself too good or too bad for others, at least he may for his own enlightenment make himself acquainted with their works. Was it then not more true, vital, and genial, as was recorded in Lanzi's and Vasari's writings, that the students of the fine arts associated with those of the industrial arts—and most likely both with scientific men—so that every maker even of useful articles came to be termed an artist? And further, may it not be the true road to every art if the early years of the artist were to be employed in the study of science, to gather knowledge and ideas clear and extensive as possible; and after an earnest pursuit of this course to step into their respectively chosen arts? The student would be now as then certainly elevated by it, from the very fact that his productions would stand in their external shapes as evidence of the minds through which they flowed. The difficulty which is admitted in the disposition of drapery, appears to lie in the deficiency of knowledge in that branch of art or science the nearest allied to it. The difficulty is even more keenly felt by an artist in the industrial branch than in the fine arts; if the figure makes a change in the attitude, and the garment gets displaced, it ceases to be becoming, and the artist drops his head wishing that living figure would keep at rest and never move to shame him; to get any recommendation through it is out of the question, it is well if only none is lost by it. Wherein then lies that difficulty, when in modern drapery at least, of which we are all eye-witnesses, there is so great an anxiety to make it truly correct, beautiful, and becoming to the figure? May not such difficulty be in the form which the drapery must necessarily receive before it is adjusted to the figure? Not only must the shape or form be given to it corresponding to the kind of form of the figure for which it is meant, but also it must be suitable in size, neither too large nor too small, nor yet the size exactly equal to the figure; after these data have been correctly settled from which the garment is to be shaped then only is to be looked for the disposition (commonly termed hanging or falling to the figure in motion) of the folds in the drapery, that they may be correctly and beautifully obtained. Here then we need the definite proportions and rules of combination by which the model for the drapery shall be shaped, not only for one, but for every kind of human form. It appears then great attention should be given that the size and kind of form in the drapery should be *first correct to each kind of form in the figure*, before the disposition of the folding and falling of the drapery can be so. If these primary parts are perfect in the model for it, all folds visible only in the movement and voluntary action of the figure are really naturally beautiful. But to be able to construct these models for drapery, according to the definite proportions of the different kinds of form, and their abnormal as well as their normal positions brings us again to the threshold of science; how can it be done without having a profound knowledge of those sciences connected with the art?

In respect to the scientific art in draping the human figure and that of draping it without guide, merely guessing, dimly and blindly feeling; and further, that works and instruction of a scientific nature are at present preferred before instruction and works void of science, need not be further argued upon, at least in this Preface. First, the work before us has stood the severest test, and received a testimonial of the highest kind. Secondly, since 1851 it is universally, specially and individually acknowledged by the most enlightened in every branch of occupation and rank, not only in England, but in whole Europe, America, &c. &c. and that not by words alone but by acts, oozing out from the discussions and the actual comparison of works as a brilliant and pervading truth, that science blended with art and art based upon science can only give perfection, not alone in that which is produced, but in the same time will develop a mental and moral life in him who produced; because in seeing the true and the beautiful, it must be that the good is perceived in them. If such is then admitted as true of all branches of occupation, it may be safely affirmed to be so of this, of which the work in hand treats, and indeed as has been mentioned, already acknowledged. If complete harmony in the industrial world shall be maintained—and industry is the first principle natural to man—then not the smallest branch of it must be neglected or left behind other branches which are advancing and developing to perfection. But the endeavour to place the industrial arts in every branch upon such an elevation, to blend them with the fine arts, so far as utility admits, and to unite them with science and to base them upon it is not quite so new as it may appear to some; then in every age and in all countries, in each branch of industry single sparks of this endeavour emanated or beamed from the mental horizon of reflecting and meditating men of science, and the scientifically practical men, although they presented themselves so rarely open and public until their numbers augmented, and the industrial university under the name of the World's Exhibition, guided by a master mind, became a centre or focus for a luminary of such a united mental brightness in the industrial sphere as to assume the character of an absolutely new movement. From this point now, all who will progress, start, and every one does in his special branch the best; and his works must ultimately prove upon what standard he raises himself, through his own application and industry.

The question, what sciences are kindred to the art of constructing the models for draping the human figure may be answered in the order in which they ought to be studied for practical application. External anatomy may be mentioned first, and it will soon become clear that this should form the commencement of the course of studies for our purpose. Distinctness and clearness in our perception and conception of form are the first requirements in every shaping and constructive art. And so in this. If we see a human figure sufficiently distant as not to distinguish if such is a male or female form, we perceive on its nearer approach, and say—as the case may be—a man. If this man comes still nearer we determine his kind of form. If we take this form nude, we become still more clear and distinct in our decision upon his form. If we take away the muscles, and see but the skeleton, the whole machinery of that form is laid open to our sight and our understanding. Those geometrical points (termed in art, points of the figure) which in designing and constructing we stand so much in need of, as the acromion of the scapula, the seventh vertebral point, the fovea axilaris, the scapula point (of the lower angle of the scapula), the sacral and the ilial points, the os pubis, and the patella, they all become distinct as to their locality; and even so with the height of the parts of the figure; as the height of the chest, the pelvis, the thigh, &c. &c. all becoming perfectly distinct. Obscurity has now vanished from the mind and it cannot again sink in darkness. Let now the skeleton be again enclosed in its muscles and skin. See that most wonderful nude. Drape it and let it move. What student could now otherwise see the human form than transparently and distinctly? Then as to application; a figure presents itself to be draped or clothed, the student will soon detect the form of that figure; he knows for instance, from his acquaintance with anatomy, if the acromion of the scapula is out of its normal position, then of necessity that its base and the lower angle are out of it also. Having a knowledge of the difference between the normal and the abnormal he can vary the normally constructed model accordingly, and proceed similarly with all other cases.

The next science in order would be a limited amount of mathematics. It must be evident to every one that having to do with shaping and forming a material, either similar, approaching to similarity, or similar and equal to a given form and size, it becomes necessary to define that quantitative material in certain proportions, at least in the correctness of the primary outline of its form and proper size, suitable and becoming to that given form. The method of doing so must therefore be mathematical in the art of constructing models for draping or clothing the human figure. The proceeding in its commencement, that of measuring correctly, is so evidently mathematical, that it needs not to be mentioned otherwise. The mathematical axioms define forms, and make our conceptions of them indisputably clear. The laws of variation of elements in a complexion or system of them, &c., are too valuable to be dispensed with. Those great and difficult problems of mathematics, applied to some high and critical point in a certain art or science are not desired to be studied here; they are the simple and primary elements of mathematics, which are beautiful and applicable as they are universal; those we recommend, and believe it necessary for every one to become acquainted with. Then these true treasures, if men were only true to themselves and to other men, would be easily accessible as they are easily learned. It may not be amiss to mention here that what is mathematical in an art or science is not (as some believe) mathematics. Mathematics is a science, and of necessity true through all the forms of its entire sphere. But every other science or art which is mathematical (not mathematics) may present, notwithstanding that it may be mathematically investigated, errors and even absurdities, although such, so far as relates to mathematics, gives results quite correct. The errors in an art or science, mathematical in method do not arise from mathematics, but they arise from the deficiency of the applicant in that art or science to which he has applied them. Mathematics in these cases are only the handmaid not the master. But if such errors and false results can occur in an art or science investigated with the aid of so true an assistant as this, how many more errors, false forms, untruths, and erroneous conclusions would appear if the method of proceeding were altogether without mathematics, resting on mere guessing or blind belief.

The third science in order would be Anthropometry, which is that one treating mathematically of the proportions of every kind of form of the human figure, form in position as well as form in dimension; exposing the laws which are developing each in their kinds of form the integral or geometrical parts as they are of necessity true and beautiful in our conception connected with or in nature. This science reveals in the same time that it mathematically defines in all its parts to the student the æsthetical principle also. As Anatomy has already enlightened the mind upon the human form, so much more must the science of Anthropometry, with far greater extension and precision, mingled with a higher degree of the distinctly beautiful; in kind, as science only can present it to the mental eye, analogous to art presenting it to the physical eye. As to its practical application, the entire groundwork of the models in this work rests upon this science. Without the definite proportions founded on it, being taken for our guide to bring truth and beauty in the models for the drapery, we should not be designers and composers in constructing them, but mere guessers or bunglers in the art, and ignorantly term ourselves talented, taking our mere physical energy for genius.

Much has often been said of system. Now every one knows that system in nature is the order in which parts or elements are connected of necessity according to laws naturally and uninterruptedly operating together. Hence systems in arts and science are methods of conveying and explaining truths and proceedings in such order as to be worthy of the term. Still works written with the view of practical facility in their application sometimes deviate from such a completely strict order, but only so far as that the solidity of the instruction is not thereby lessened. Be it remembered that solid and accurate instruction and learning are different to practising them, though theory and practice can perfectly agree. The scientific method of this work will soon become apparent to the student, and it will be seen by the initiated whether it deserves the elevated term, system. But in a practical view or application, the system before us of constructing models is *not* to systematise merely a few points, lines, and parts into a model, expecting then that the figure shall come and fit itself to that, but *the system here in hand is to construct a model according to any kind of form of any human figure which may happen to present itself, to be draped or clothed in whatever style and costume chosen,* and that in the same time becoming and suiting.

From all that has been said it appears evident that modelling for draping the human figure properly and correctly viewed is an art, and in its fundamental principles in the same time a science; it will be, as it is, not only sought for the mere material usefulness, but also for enlightenment and pleasure to the mind, especially in cultivating a taste for the beautiful in the choicest of forms. Perhaps it may here be mentioned that the groundwork in the models presented contains fundamental and general rules, which are unfettered and free from any style or costume, although presenting in their application the special European modern costume, as being in our time the most suitable and general among most nations. And especially for this reason; the artist, being well versed in the contents of this work, has means in his possession which will serve him in every country, at any period, modern or ancient, in which he may be obliged to place himself, and his calling shall lead him to the art of designing and composing for draping the human figure. But whoever will gain, and when gained, keep the elevation of master in his art in the true sense of the word, let him not believe he can relax in the science or in the practice of it; the deficiency in any art whatever which we may pursue has always its origin in the deficiency of knowledge in the natural science kindred to that art. Let every one suspect himself of human weakness and shun the easy method of bungling and living upon the wrongs inflicted upon others who must receive such bungling products as if they were really perfect. Such is human weakness, and unless incited to learning and application by some self-supporting or foreign energy, men live rather in ignorance and unskilled; they sink beneath the proper standard which they ought to maintain, and that not only in the art which they are presumed to pursue, but with such debasement they sink in their very being as enlightened and morally free agents.

In conclusion we may say that it is sufficiently clear from the whole Preface, by itself, without an especial aim to establish it that the true and the beautiful are presented in the industrial principle; and that as it is proved from mental philosophy, according to the mental laws, we cannot avoid seeing goodness in the true and the beautiful. We will therefore endeavour unceasingly to let such be exemplified in the qualities of our productions, combining pleasure with utility, that we may derive gratification from seeing that our works impart it to others, and so while the good reveals itself in the true and the beautiful it may become a living moral in our actions, and not sink into the degrading unartist-like corruption which creates and forms but for the purpose of sale, and not for quality or use. If I do not go beyond my limits in the advocacy of moral truth, then surely as time and space are universal and never can be annihilated, being presented everywhere that matter assumes a tangible and visible form in the combination of these elements, there will always spring up *being* as a goodness which will annihilate the bad; and the wrong doer and idler will feel, or those nearest to him the sting of painful suffering. Individuals, Firms, Towns and even States, when corrupt shall sink before the self-establishing everlasting good. In ignorance we scorn this, the wise and good will see, learn and gain.

HENRY WAMPEN.

CONTENTS.

	Paragraph	Page
Preface,		i
On Mensuration,	1	1

MODELS FOR DRESS AND FROCK, NORMAL IN DIMENSION.

	Paragraph	Page
A. according to the proportionate form,	15	7
B. ,, ,, broad or Herculean form,	18	8
C. ,, ,, slender or Mercurial form,	20	9

ABNORMAL IN DIMENSION.

	Paragraph	Page
A. Explanation,	22	11
B. Construction,	24	11
a) $h < b$, D^{+}_{I},		
b $h < b$, D^{+}_{I}, D^{+}_{II},		
c $h < b$, D^{-},		
$h > b$, D^{-},	25	12
C. Placing of the parts of the Model,	26	13
D. Sleeve and Skirt,	28	14

ON VARIATION.

	Paragraph	Page
A. according to position,	30	17
B. ,, ,, style,	39	41
C. ,, ,, mixed variation,	44	24

CONSTRUCTION—*Continued.*

	Paragraph	Page
Models for Vest,	54	31
,, ,, Tunics,	58	32
,, ,, Trousers,	62	35
,, ,, for a proportionate figure,	64	
,, ,, ,, slender figure,	66	37
,, ,, ,, broad figure,	67	38
Style,	69	38

MODELS FOR HABITS.

	Paragraph	Page
Measure,	71	41
Proportionate form,	73	42
Broad form,	75	42
Slender ,,	77	43
Sleeve,	79	44
Skirt,	80	44
Models for over Habits,	81	45
,, ,, over garments falling to the figure,	83	47
,, ,, loose garments,	91	51
Breeches,	96	55
Gaiters,	101	57
Appendix,		

ON MENSURATION.

INCH MEASURE.

¶ 1.——The measure which is necessary to our purpose consists of a tape half an inch broad, and from seventy-two to eighty inches long, oil painted and marked in inches, numbered 1, 2, 3, &c., &c. Leather, parchment, or even paper is sometimes taken for such a measure. The old masters used measures without being marked in inches, and in measuring made signs (hieroglyphics) on them. Each one had hieroglyphics after his own choice, which could not be understood by anyone but himself. This obliged them to have as many measures as they had persons to measure. But as we in the present time adopt the inch measure, it is merely needful to write down the number of inches as the result of a measurement of the person; and it will be seen that this is a much more easy method than the former, as well as more convenient to keep a few numbers in a book for the purpose, than to be encumbered with a quantity of loose measures.

It is quite immaterial whether the measure, with which the size is taken, is English, German, or French, if only it is observed that the quantity taken corresponds with the proportion measure according to which the model shall be constructed. But before going farther with the explanation of it, we will treat upon measuring and the proportion measure; but so much may be noticed here, that in measuring we choose the English inch measure; and to have the correct English inch at hand, it is given in fig. 5, plate I., marked upon a right angle.

MEASURING.

¶ 2.——From every kind of form of the human body, and for every kind of drapery belonging to it, measures must always be taken in one and the same manner, which should be so often repeated, that in every case the result obtained by measuring the same person should be precisely the same, however often it may be done. This is the proof of certainty, which is only to be obtained by repetition; and before such certainty is obtained, the quantities taken cannot be looked upon as correct. The measures to be obtained are partly fixed, and partly changeable. The fixed are those taken from the body of the person, those are termed changeable taken from the drapery; both of which in the following will be treated more definitely.

THE MEASURE FOR DRESS, FROCK, JACKET, AND UNIFORM, &c.

¶ 3.——The person to be measured stands in an upright position, we then place the inch measure on the bone of the neck (7th vertebræ), as exactly as it can be ascertained through the clothes (drapery); keep the measure fixed in this locality, and lead it down to the greatest depression above the sacrum, which would be the natural length of the back of the human body. Keep the measure here fixed also, and carry it down to the heel of the boot, or sole of the foot, behind in the middle of the heel (tarsus). At the same time when the measure is so placed, we take the length of waist that it is intended the drapery shall have, and also the length of the skirt. The length from the bone of the neck to the natural back length is termed the natural waist length; and the length of waist intended for the drapery is termed style waist length; that of the skirt is termed skirt length; and lastly, that from the bone of the neck to the sole of the foot is the ground length. When circumstances require the entire height of the human body, it can most easily be taken by placing the person against the wall, and marking the height with pencil, afterwards measuring it with an inch measure. This is termed the height. The fixed measures from these are: the natural waist length, the ground length, and the height. The changeable measures are: the style waist length, and the skirt length.

Further, the person being measured extends the right arm in a straight line with the back, forming a right angle with the lower part of the thorax, and at the same time holding the fore arm to the upper arm also in a right angle. With the arm in this position, place the measure in the middle of the back and carry it to the elbow; keep it here fixed, and lead it to the length intended for the sleeve. That length, from the middle of the back to the elbow, is termed elbow length; and the other is termed sleeve length. The former is a fixed measure, and the latter changeable. The circumference of the arm, as well as the width of sleeve, may be taken; but these measures may be dispensed with.

Lastly, place the measure, without shifting it, over the vest, exactly under the arm round the body, at the greatest dimension of the thorax. The measure so obtained we term in Anthropometry thoracial circumference; in common it is termed breast measure (denoted by the sign O). Next place the measure in the lower region of the thorax, in its greatest depression, and consequently in its smallest dimension, round the body, which obtained quantity is termed ilial circumference; in common, size of the waist (denoted by the sign U). Both these are fixed measures. For a vest, the breast measure and the size of waist are taken in the manner just described; and it may be mentioned in the same time that the length of a vest is found by placing the inch measure on the bone of the neck, fixing it in that locality, and thence leading it down in front to the desired length; the same is done if a jacket length is required. Should the measure be for an uniform, the circumference of the neck must also be taken. The measures for over clothing are obtained as here described for dress and frock, but the breast measure for a cloak is taken over the frock.

¶ 4.——The measure for trousers is taken in the following manner; place the inch measure exactly above the hip (ilium), in the waist (ilial depression), on the side of the body; keep it fixed here, and lead it down to the side of the knee, and from hence on the outside to the sole of the foot. This measure is termed side length; that to the knee, knee height. Next place the measure close to the trunk inside the leg, keep it here also fixed, and carry it again down to below the knee (tibial indentation); from thence lead it down to the sole of the foot, keeping it all the time on the inner side; this is the leg length, and a fixed measure, as are all the others. Those which may be taken according to circumstances, as for instance for a knee trousers, &c., are changeable measures.

The breast measure (O), as well as the size of the waist (U), are taken for trousers as above described for dress and frock. If the size of the thigh is taken, the measure must be placed exactly close to the trunk round the thigh; the size of the knee must be taken round it in the middle of the patella; that below the knee through the tibial indentation.

A form or order in which measures are taken is as follows:—

Natural waist length .	16½ in.	Elbow .	20 in.	Side length for Trousers .	41 in.
Style waist length . .	18 ,,	Sleeve .	31 ,,	Leg length .	31 ,,
Skirt length. . . .	38 ,,	O . . .	18 ,,	&c.,	&c.,
Ground length . . .	56 ,,	U . . .	15 ,,		

Or entire height, 64 in. = 5 feet 4in. Vest length, 23 in.

PROPORTION MEASURE.

¶ 5——When we have to do with length measures in the construction of models, they are mostly used entire, but the circumference is, on the contrary, always taken in half; for example, when the entire circumference is equal to 36 in., take 18in. and say, O = 18 in., proceeding thus with all the other circumferential magnitudes, as U = 15 in., which here means the half size of the waist. Although we receive the magnitudes from the human body, by measuring, in inches, however many inches the breast measure (O), or the ground length (expressed by G) may be, still we do not take the O and G in inches, but in their concrete quantities, and divide O as well as G into a certain and definite number of parts.

See fig. 1, pl. I., the $A'B'$ here represents O, and is divided as it has been in Anthropometry; *viz.*, $A'B' = 19$ units (abbreviated *u* from unit), so that $a\,B' = u$, $a\,b = 6\,u$, $b\,c = 6\,u$, and $A'c = 6\,u$; also $A'B' = u + 6\,u + 6\,u + 6\,u = 19\,u$. As now $a\,b = 6\,u$, and as o is $3\,u$ distant from a in the direction of b, and also as $a\,B' = u$, so is $o\,B' = 3\,u + u = 4\,u$. C′ D′ represented thoracical circumference in Anthropometry, in which also, the proportion measure, it is needful to observe is $A'\,B' = C'\,D'$, that $A'\,B' = 19\,u$, and C′ D′ also contains $19\,u$; consequently an unit (u) in A′ B′ is equal to an unit (u) in C′ D′; farther, that $o\,D' = o\,B'$, and $C'\,o = A'\,o$.

But from this the proportion measure, by which the model is constructed, differs. For which see fig. 1, pl. I., A B. This measure is only divided in 18 units (u); *viz.*, $A\,c = 6\,u$, $c\,b = 6\,u$, and $b\,B = 6\,u$; and also $A\,B = 3 \cdot 6\,u = 18\,u$.

This division is made in the following manner: divide A B in three parts, A c, c b, and b B; divide A c again in three parts, A e, e d, and d e; lastly halve A e in f, and take A f as an unit (u). The o is marked $3\,u$ distant from B towards b. The distance from A to o is here as in Anthropometry termed normal. But by this proportion measure, according to which the models are constructed, A o is termed the normal size of the waist.

¶ 6.——On a comparison of the two proportion measures, that is A B with A′ B′, it will be found they are equal to each other, $A\,B = A'\,B'$; then A B as well as A′ B′ are taken singly, equal to the thoracial circumference, namely, $A\,B = C'\,D'$, in which it is also $A'\,B' = C'\,D'$. But the unit (u) in A B, differs from the unit (u) in A′ B′, because $A\,B = 18\,u$, and $A'\,B' = 19\,u$, according to the foregoing. As A′ B′ is divided into a greater number of parts than A B, so necessarily u in A′ B′ is smaller than u in A B.

In the construction of a model from the proportion measure A B (as will be shown when we have advanced so far), it is found that the breast measure (O) is equal to C D. Now $C\,E = A\,B = 18\,u$, and $E\,D = u$, namely, $E\,D = A\,f$, consequently it is $C\,E + E\,D = 18\,u + u = 19\,u$. As $C\,D = C\,E + ED$, so is also $C\,D = 19\,u$. Now $19 > 18$, and $u = u$, therefore $19\,u > 18\,u$, and with this $C\,D > A\,B$. It is also $o\,D = 4\,u$, $o\,E = o\,B = 3\,u$, and $E\,D = u$, consequently is $o\,D = o\,E + E\,D = 3\,u + u = 4\,u$.

As now according to the foregoing there are the same number of u in C′ D′ as there are u in C D, and as further $C\,D > C'\,D'$, so it follows also that the u in the breast measure C D is larger than that in the thoracial magnitude C′ D′ ($u > u'$), and also that $4\,u$ in C D are larger than $4\,u'$ in C′ D′, and with this $o\,D > o\,D'$.

The difference between the proportion measures A B and A′ B′, and the difference between the results C D and C′ D′ must be particularly observed; first, because they are a part of the links between Anthropometry and the construction of models; secondly, A′ B′ as well as A B has been given equally large from one and the same human body, and it is especially intended to divide A B into a lesser number of parts than A′ B′, so as to obtain C D larger than C′ D′ with an equal number of units (u) on purpose that the form of the model shall be obtained equal to the form of the body; only the model, in its superficial contents, is in the same time larger than the superficial contents of the body; for it is known by experience that when a physical surface, however thin, is placed round a convex or round body, it is taken up in quantity, and would be too small if constructed no larger than the mathematical surface of the body.

FURTHER EXPLANATION OF THE PROPORTION MEASURE.

¶ 7.——In the foregoing paragraph sufficient has been said to make it perfectly clear, that the following proportion measures for practical purposes are correctly founded.

From Anthropometry we learn that there are three kinds of form of the human body, regarding their height to their tharacial circumference: namely, proportionate, broad, and slender forms; even so we have now to consider three different kinds of proportion measures, through which the forms of the body are known and by which models are constructed corresponding to those forms.

To make a proportion measure we take $\frac{1}{7}$ of a given ground length, however many inches the $\frac{1}{7}$ part may consist of, and marking that quantity off upon a tape or strip of parchment or paper, see fig. 2 in which $A\,H = \frac{1}{7}$ of the ground length; or, if the entire height of the human body is given, then is $A\,H = \frac{1}{8}$ of the height, as, according to Anthropometry, $\frac{1}{8}$ of the height is always equal to $\frac{1}{7}$ of the ground length. Now halve A H in I, halve again A I in K, and, lastly, halve A K in L. This quantity A L take as an unit and term it h, that it may be understood it is an unit from the height, or from the ground length, which is the same. Now carry on the strip the thoracial circumference (breast measure O), see A B, fig. 2. Divide A B in three equal parts, A D, D C, and C B; divide again A D in three equal parts

A F, F E, and E D; lastly halve A F in G. Now take the quantity A G as an unit and term it b, to denote that such quantity is derived from the breadth or circumference of the human body; hence h and b each denote a quantity of different kinds.

The units are found in the next two figures 3 and 4, in the same manner as the units h and b in fig. 2, and, therefore, it would be only unnecessary repetition to describe them here. The fractional parts of the unit h and b are marked as follows: $\frac{1}{4}\,b$, $\frac{1}{2}\,b$, $\frac{3}{4}\,b$; or $\frac{1}{4}\,h$, $\frac{1}{2}\,h$, $\frac{3}{4}\,h$; or, when the smaller of the two quantities is described with k, as $\frac{1}{4}\,k$, $\frac{1}{2}\,k$, $\frac{3}{4}k$.

COMPARISON OF THE UNIT h WITH THE UNIT b.

¶ 8.——If we compare the two units h and b, so must it be true of them what is invariably true of two quantities: namely, according to the primary mathematical axiom, two quantities, h and b, are equal to one another or not equal. Although both quantities, h and b, as height and breadth are not of the same kind, still, taken as lines, they are both of the same kind and can as such be compared.

To commence with fig. 2. On comparing h with b it will be found that h is equal to b (abbreviated $h=b$), and the ratio of these two quantities, h to b is as 1 to 1 (abbreviated $h : b = 1 : 1$), which means to say, h is to b in the ratio of equality; by which it may be known that the human body, whence this measure is taken, having such qualities in its units h and b, is a proportionate body: namely, in its height to its thoracial circumference.

Second. On comparing h with b in fig. 4 it will be found that h is smaller than b (abbreviated $h < b$), which means h is in ratio to b as 1 to 1 plus difference (abbreviated $h : b = 1 : 1 + d$), or h is to b in the ratio of inequality, and in the same time in the ratio of minority. From these qualities of the units of a measure it may be known, that the human body, from which it is taken, is a broad form with respect to its height to the thoracial circumference.

Third and lastly. Comparing h with b, see fig. 3, it will be seen that h is larger than b ($h > b$), which means h is to b as 1 to 1 minus difference (abbreviated $h : b = 1 : 1 - d$), as we say h is to b in the ratio of inequality, and especially in the ratio of majority (h is always placed the first and b the second in order). From this quality of h and b in the measure, it may be known again that the body, from which it is taken, is a slender form.

TO FIND THE NORMAL SIZE OF THE WAIST.

¶ 9.——In fig. 2, as explained in paragraph 8, the $h=b$, and in this instance it is needful only to use the quantity b, leaving h unobserved, although it is immaterial which of them is chosen in the present case. On this measure A B (abbreviated O), to find the normal size of the waist (abbreviated N), carry from B towards A the 3 b; so that o B is equal to 3 b (abbreviated $o\,\mathrm{B} = 3\,b$); the A o gives the normal size of waist (N). The whole expression abbreviated is $\mathrm{O} - 3\,b = \mathrm{N}$.

In fig. 3 the case is somewhat different. To find the normal size of the waist it is necessary here to take b, not h; and again, it is o B equal to 3 b, and with it A o, equal to the normal size of the waist (N). The whole expression abbreviated stands $\mathrm{O} - 3\,b = \mathrm{N}$.

Fig. 4 presents another difference. To find the normal size of the waist in this case, we must necessarily carry from B out 3 h on the measure, so that $o\,\mathrm{B} = 3\,h$; and be particularly careful to take h and not b. A o is here also the normal size of the waist (N). The abbreviated expression is $\mathrm{O} - 3\,h = \mathrm{N}$.

To find a general expression for this locus o, we say: set off the smaller of the two h and b, which smaller shall be termed k; then the following expression may be chosen, namely, $\mathrm{O} - 3\,k = \mathrm{N}$. This also may be given in different words: deduct from the breast measure (O) three of the smaller quantity, namely, of h and b (k); and the difference is the normal size of the waist (N).

To find a locus of degree (I) on the measure fig. 4, make I B equal to the third part of o B, which is $\mathrm{I\,B} = \frac{1}{3}\,o\,\mathrm{B}$; and proceed in the same manner with the foregoing two measures, fig. 2 and 3, to find the locus of degree.

It cannot be completely proved in this place, as it would lead us too far, why the smaller of the two quantities h and b must always be taken to obtain N, or the locus o, but it must be looked for in Anthropometry.

COMPARISON OF THE NORMAL WITH THE REAL SIZE OF THE WAIST.

¶ 10.——The size of the waist which is given by taking the measure is termed its real size (abbreviated R), that it may be distinguished from the normal or ideal size (N). These two quantities R and N are originally by themselves positive (+) quantities. By making a comparison in fig. 4 of the real size of waist (R) with the normal size A *o* (N), it will be found that $R = N$, and consequently $R - N = o$; for this reason the normal locus is suitably marked with *o*, which indicates that the quantity goes up and leaves no difference. From this quality of R and N we know that the human body, from which the real size of the waist (R) is taken, is normal in its waist to its breast measure. In this case it is often termed proportionate, but it can only be said in a confined sense, and, scrutinized, the expression can apply no further than to fig. 2.

On a comparison of ${}'R$ with N, see fig. 4, it will be found it is ${}'R < N$, and, therefore, will be ${}'R - N = -D$ (namely, the smaller ${}'R$ deducted from the larger $-N$ gives $-D$), and from this difference $-D$ it is found that the human body, from which the real size of the waist (${}'R$) was obtained, is abnormal and especially negative (—) to its breast measure.

Lastly. Comparing R' with N we find that $R' > N$, and, therefore, $R' - N = +D$, which means the smaller $-N$ deducted from the larger R' gives $+D$, and by which it may be known that the human body, from which this measure is taken, is abnormal in its waist size to its breast measure, and especially positive +. Compare, also, R'' with N; it is the same kind as R', only that R'' is different in degree, meaning that R'' is larger than R'. The difference between *o* and I we denote with D^{+}_{I}, which read positive difference of the first increase; and the difference from I, however large or small R'' may be, passing I is denoted with D^{+}_{II}, as shown in fig. 4, and a body of this measurement is said to have a positive difference of the second increase, commonly termed an abdominal body. Remark: the sign of quality + may be put above and following D when required by circumstances, instead of before it. For instance: instead of $+D$ it may be written thus, D^{+}; and so with ${}^{-}D$, it may be placed thus, D^{-}.

It is in the same time to be observed, that the quantity N is always unalterable, and, consequently, the locus *o* is fixed; but opposite to this the quantities R, ${}'R$, R' and R'' are actually only one quantity, which is larger or smaller through its fluctuation; for which reason its alterable conditions are denoted by accents. R is also a fluctuating quantity, and therefore the differences D^{-}, D^{+}_{I}, and D^{+}_{II}, are alterable or fluctuating quantities.

What has been giving in this paragraph of N and R applies to the two other figures 2 and 3, and therefore not necessary to be repeated here.

PROPORTION MEASURES OF REAL SIZE.

¶ 11.——There is presented in pl. I. an entire series of ready-prepared proportion measures of the real size, commencing from the small size, 10½ inches, up to the large size, 25 inches in the breast measure. They are given in a finished state that they may be ready at hand for immediate application, particularly in cases where there is scarcely time to construct the model. They can be very easily copied upon parchment, leather, tape, or even paper, according to convenience. These measures are made in the same manner as already described, only that the units are marked out in full up to 12, which in the description of them is not done.

In the row A are found all the breast measures; the row B gives the ground lengths; the row C denotes the entire heights of the human body, and the sizes of these measures are giving in inches; lastly, in the row D the whole height of the body is given, but expressed by its number of feet.

For example, when found by measurement that the breast measure is given equal to 18, look for the number 18 in the row A, and take that proportion measure for the breast measure on which the number falls. Next look for the ground length, which falls in the row B, and may be, for instance, 56 inches. The proportion measure containing that number is to be taken for the ground length. To make this more distinctly understood it is necessary to remind that only one-seventh of the ground length is marked on these measures, which one-seventh is here on the proportion measure crossed on a line at No. 8; further, that these eight units are the seventh part of the ground length is quite clear, as 7 times 8 are 56. Such is the case with all the rest of the measures; the ground length will always be ascertained by multiplication, if we take the number of units in inches, and multiply the number of inches by 7. That the eight units in the proportion measure 18 exactly agree with eight inches is because, in this case, one unit of the proportion measure is equal to one inch; but this is the only instance in which they correspond, not being the case with any others.

If it should happen that a given measurement is not obtained by an English measure, or if it is merely taken with a plain tape, and the different sizes marked with symbols, it is simply to lay the given measure on the proportion measures until the one is found which exactly agrees with that of the required size.

¶ 12.——In those cases where it occurs that the breast measure and ground length are on one and the same measure as, for instance, when the former is 18, and the latter 56, then we say that the human body from which such is taken is a proportionate form.

Should it happen that the proportion measure on which the breast measure falls is larger than that on which is found the ground length, then we say that body from which it was taken is a broad form; for instance, where the ground length is 56, and the breast measure may be 21 inches.

On the contrary, should it occur that the proportion measure containing the breast measure is smaller than that containing the ground length, as, for instance, the former should happen to be 18 and the latter 63 inches, it may be known that the body whence it was taken is of a slender form.

¶ 13.——The signs *o* and I in the proportion measure have been found in a manner similar to that described in the foregoing figures 2, 3, and 4. It remains to be remarked that those bodies are seldom proportionate when the breast measure runs as high as 21, 22, 23, &c. inches. For this reason all bodies which measure beyond 18 are treated in locating *o* and I as if they were broad forms; and in degree as they exceed that measurement more decidedly so; and there would be no sensible incorrectness if it should happen that a large size is taken from a proportionate form.

Lastly, in denoting the size of the waist on the proportion measure containing the breast measure belonging to it, it will immediately be discerned whether the size of waist meets *o*, or does not reach or passes beyond it. Should it not reach, it will be D^{-}, and should it pass, it will be D^{+}_{I}, or D^{+}_{II} in a similar manner to that presented in fig. 4. Fractional parts of the units, as the measure shows, are denoted thus: $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$.

¶ 14.——Fig. 6 on pl. I. represents an instrument (protractor) with which angles are measured. As, for instance, the angle of a dress skirt is equal to 107°; but with its assistance every other angle required can be constructed.

ON CONSTRUCTION.

MODELS FOR DRESS AND FROCK.

A, ACCORDING TO THE FORM OF THE FIGURE, $h=b$, o; NORMAL FORM IN DIMENSION.

¶ 15.——To construct a model for this form, $h=b$ and o, which has been mentioned in paragraphs 8, 9, and 10, under Mensuration, the following must be observed. This form of the figure, according to which these models are constructed, is normal in dimension, because $h=b$, and the real size of the waist (R) is equal to the normal size, (N) hence the difference between both is o; the position of the figure is not alluded to in the construction, but it is erect, and consequently normal.

In the construction of a model, we take a proportion measure, of a size at liberty, which is made to the above form (see paragraph 7, Mensuration); for instance, such as that at fig. 1, pl. 2; or take a measure from a definite size, supposing one to be given of 18 inches breast measure, 56 ground length, and 15 the real size of the waist, as described in paragraph 11, Mensuration.

Fig. 1, pl. 2, exhibits a measure, A B where $h=b$, and the real size of the waist (R) is equal to A o, which means it is equal to the normal size of the waist (N). The model on pl. 2, is constructed after this measure. The quantity A C = $\frac{1}{7}$ of the ground length, the same as mentioned in paragraph 7, Mensuration.

¶ 16.——The Models are constructed by placing their co-ordinates under right angles, and making them as large as the proportion numbers denote, which are given with them; for exanple, in fig. 2, pl. 2, it is seen that A B=1½, B C=7, and C D=8; to continue A E=3, B F=7¾, and C G=4½.

These co-ordinates A B, B F, &c. &c. in the back are taken as a whole in their connection with each other, termed ground form, on the correctness of which mainly depends again the fit of the model to the figure. The other form A K I H L D in the back is termed style form, and to a certain extent is not necessarily of such precise conditions as the ground form; and it is to a certain degree free drawn, if only in producing it the form of the human figure is kept constantly in view, so—namely, that one part of the style form suits to the other, as, for instance, A K to I H to D L; and still farther, that such parts are also suitable to the figure and to the kind of drapery; for in this consists the artistical arrangement of the model to the figure, through which taste in it is generated.

What has been said of the hind part, fig. 2, applies in general to the forepart of the model fig. 3, also. The co-ordinates A G, A B, B C, B F, &c., are here again placed under right angles, and defined through their proportion numbers, A B=3¼, B C=5½; but C D is equal to C D of the back, and E I is equal also to C D of the back. Farther, A G=2½, B F = 7¾, C E=9, &c., as is seen by a reference to the numbers. It must be particularly observed that C E I is equal to a right angle, and that K E H also must be taken equal to a right angle in the construction. The I H=1½ defines the position of the E H.

¶ 17.——The observations made upon the figure in pl. 2, are applicable also to pl. 3, only, with the exception that the style form is here altered; that in pl. 2 is short in the length of the waist, while this on pl. 3 is long. In the long waist, fig. 2, pl. 3, it would look very unsuitable were A B to be taken as small as the corresponding part on the back, with the short waist, fig. 2, pl. 2. For this reason, the suitability of one part to the other in the style form must be observed here, and therefore the two models long and short in the waist present a good example on comparing the one with the other.

One part remains especially to be observed in these two styles, namely—the indentations. In fig. 3, pl. 2, the indentation is given $L\,M = 2\frac{1}{4}$; but opposite to this, in fig. 3, pl. 3, $L\,M = 1\frac{3}{4}$, and notwithstanding this difference, either of the models go with equal closeness to the figure. That it is correct must become quite clear, when it is remembered that a straight line drawn from M to N will be equal to the curved line N I H O, in fig. 3, pl. 2, and in the same time brought in mind that these two lines have one and the same place on the human body.

The letters *h* and *b*, units of the proportion measure do not accompany the proportion numbers in these models, because it is not necessary that they should be distinguished from one another here, as they are equal.

In fig. 2, pl. 2, the normal length of the waist, the style length, and the natural or real length D, all fall in one point; but in fig. 2, pl. 3, the style length of the waist falls deeper, namely, on C.

B, ACCORDING TO THE FORM OF THE FIGURE, $h < b$, o; NORMAL FORM IN DIMENSION.

¶ 18.——This form, $h < b$, and o, is that which occurs in the second case, paragraph 8, in Mensuration, by comparing the unit *h* with the unit *b*; and farther in paragraph 10, by comparing the real size of the waist (R) with the normal size (N).

The fig. 1, pl. 5, shews a proportion measure of this property, where *b*, in the breast measure A B, is larger than *h* in A C, (remember in paragraph 7, in Mensuration, that $A\,C = \frac{1}{7}$ of the ground length), namely—that $h < b$ and the real size of the waist $R = A\,o$, and is equal to the normal size of the waist N; according to this measure the models on pl. 4, and pl. 5 are constructed.

The construction of models in the broad form is proceeded with in the same manner as in the proportionate form, but with this difference; first, all lengths in the model must be taken from the units of the height measure of the figure, A C, fig. 1, pl. 5. Again, remember $A\,C = \frac{1}{7}$ ground length, paragraph 7, Mensuration. Second, that all breadths in the model must be taken from the units of the breast measure of the figure, A B, fig. 1. To distinguish the two quantities, *h* and *b*, it is necessary in this instance to give the *h* with the proportion number when *h* must be used; and hence *b* accompanies the proportion number for the same reason.

It must be especially observed that here the indentations A B and C D (fig. 2, pl. 4), and also A B and C D (fig. 3, pl. 5), must be taken from *h* and *not* from *b*. Particular stress is laid upon this, because the indentations appear to be breadths of the figure; but they are neither breadth nor height, and must therefore always be taken from the smaller of the two quantities *h* and *b*, which in this case is *h*. It has already been observed in the division Mensuration, that the cause of this proceeding is explained in Anthropometry; but those who have not made this science a study must take its correctness for granted. It may, however, be remarked that the figure of a man of broad form does not in proportion fall in (carry so much indentation), in the iliac region, as the figure of a proportionate person. It must be observed that the proportion numbers do not alter with the differences of form, as the models of proportionate and broad forms show on a comparison of them, because the alteration ensues by itself through the units of the proportion measure, see Mensuration. If it is intended to construct a model of a broad form from a ready prepared proportion measure pl. 1, then it is of that kind, as treated of in the second case, paragraph twelve in Mensuration. But then in the construction of this model two of those measures are used; the lengths and indentations are taken from the smaller one, which is here the ground length, and the breadths from the larger one, which in this case is the breast measure; for instance, suppose the ground length to be 56 inches, and the breast measure 21 inches, and the real size of the waist to agree with the normal size of the waist in this breast measure.

¶ 19.——The style form in the broad model is obtained in a manner similiar to that in the proportion model; it is, however, to be observed, that on the hind part the breadth of the style form is obtained by adding the half of the difference of the two quantities $6\frac{3}{4}\,h$ and $6\frac{3}{4}\,b$ to the smaller quantity $6\frac{3}{4}\,h$, as shown in fig. 1, pl. 4, and fig. 2, pl. 5. The mathematical expression for the above is this: The breadth of the hind part $A\,B = 6\frac{3}{4}\,h + (\frac{6\frac{3}{4}\,b - 6\frac{3}{4}\,h}{2})$. That number is taken which is at the time demanded by the proportionate form in the breadth of the back, being at present $6\frac{3}{4}$ (see the proportionate model). It must become clear that it is perfectly correct to reduce $6\frac{3}{4}\,b$ in the back part of a broad form, when it is considered that a man of broad figure has already too much in breadth to appear beautiful, and for this reason art may lend its aid to avoid any appearance of being too heavy or too broad, when it can be done suitably and without any injury to the fit.

The normal length of waist, C, in fig. 1, pl. 4, and C, in fig. 2, pl. 5, is arrived at in a similar manner to the breadth of the back in the style form. Here also is the half difference of the two quantities, $8\,h$ and $8\,b$, added to the smaller quantity $8\,h$, to obtain D C; and hence it is $8\,h + (\frac{8\,b - 8\,h}{2}) = D\,C$. In fig. 1, pl. 4, again lies the natural or real length of the waist, and the style length of waist, with the normal length of waist in one point, which means to say these three quantities are all of the same length. Opposite to this in fig. 2, pl. 5, the style waist length E lies deeper than the other two lengths, which lie in this case also in C; meaning that the style length of the waist is larger than the normal length, and also larger than the real or natural length of waist.

C, ACCORDING TO THE FORM OF THE FIGURE, $h > b$, o; NORMAL FORM IN DIMENSION.

¶ 20.——This form, $h > b$, and o, is that obtained in the third case of paragraphs eight and ten, in Mensuration, by comparing their relative quantities, and fig. 1, pl. 7., represents a proportion measure of this property. On this figure A B is the breast measure, and $B\,C = \frac{1}{7}$ ground length; and farther the same figure shows that the unit h in B C is larger than the unit b in A B, meaning that $h > b$; and also that the real size of the waist R, (see E F), is equal to A o, indicating that R is equal to the normal size of the waist (N); for which reason o is marked in A B at D. Lastly, according to this measure the models in pl. 6 and pl. 7 are constructed.

It is again in the construction of models of this slender form, as with the foregoing given in paragraph sixteen, with the difference, first, that in fig. 1, pl. 6, the quantity A M is equal to $1\frac{1}{2}\,b$ plus O A. This O A is at least equal to $\frac{1}{4}\,b$, but it must be taken larger according to circumstances, depending on the height of the figure in the axilla; sometimes $O\,A = \frac{1}{2}\,b$, at others equal to $\frac{3}{4}\,b$. But however large this quantity, O A, may be, whether it is $\frac{1}{4}\,b$, $\frac{1}{2}\,b$, or $\frac{3}{4}\,b$, or even more, F G in figure 2 must be the same quantity also, namely $O\,A = G\,F$; and hence invariably $F\,H = 3\frac{1}{4}\,b + G\,F$. And farther, as in this case, $O\,A = \frac{1}{4}\,b$, so also $G\,F = \frac{1}{4}\,b$, therefore it is here also that $A\,M = 1\frac{3}{4}\,b$, and $H\,F = 3\frac{1}{2}\,b$.

Second, the normal length of the waist, G, fig. 1, pl. 6, is found when half of the difference between the two quantities, $8\,h$ and $8\,b$, is added to the larger quantity $8\,h$; *viz.* the mormal length of the waist $C\,G = 8\,h + (\frac{8\,h - 8\,b}{2})$. In this model the real length of the waist again agrees with the style length, and the normal length, so that all three become equal, and fall upon the point G. Opposite to this it will be seen that the style waist length D, fig. 2, pl. 7, falls deeper than the normal waist length B; for which reason this form is termed a long-waisted form in style.

Third, the indentations I K, B C, fig. 2, pl. 6, and I K, F G, fig. 3, pl. 7, must be taken from the smaller of the two units h and b, which, in this case is b. It is repeated here as requiring particular observation, that in none of the figures are the indentations either height or breadth; and in the construction of the models, they must always be taken from the smallest quantity, whether it may be h or b. All the other quantities, in models of a slender form, are to be taken from b, as seen in fig. 2, pl. 6, where b is given with the proportion number. The proportion numbers are, for the greatest part, not written out with the model, on pl. 7, because this model is of the same form as that on pl. 6. The two models are only distinguished from each other in this particular, the one on pl. 7 being of a long waisted style, and that on pl. 6, is a short waisted style. The styles have been already under consideration in paragraph 17, in the proportionate form, and therefore do not require any further description in this place.

¶ 21.——As now Anthropometry comprehends three different kinds of form in the human figure, namely, in the height of the figure to its thoracial circumference, and, therefore, according to dimension; even so have we here also under the divisions A, B, and C, three different forms of models, taking their length in relation to breadth, also according to dimension, namely the forms, $h = b, o$; $h < b, o$; and $h > b, o$; all three of which are constructed conformably to a normal, or erect position of the figure, which was alluded to in paragraph 15, as being tacitly included in the forms. These three forms are, therefore, termed normal forms of models in dimension and position; there are no other kinds in existence; all deviations from them must be abnormal in dimension, or in position, or abnormal in both dimension and position, which will be fully considered at a suitable time.

It may now be readily seen that the normal forms are those especially requiring exactness, before the construction of any other, or the abnormal can be attempted; for they are the starting points in the movement towards scientific thinking in systematic order in the construction of all succeeding forms.

In Anthropometry it can fairly be observed that there are forms in the human figure under the class $h < b$, and also under that of $h > b$ which can be abnormal in these dimensions. But as the human figure in this respect, namely in the whole height to the thoracial circumference, is very rarely so far abnormal as to render it necessary that it should be taken into consideration in constructing models for the arrangement of drapery, this abnormality becomes here of no moment, and it is thought better to leave such in Anthropometry, where it is a purely scientific question, for detecting laws of formation in living nature, and especially those relating to the human figure. So, the abnormal form in dimension, the size of the waist to the thoracial circumference, is only to be taken into consideration, when abnormal form in dimension is spoken of, which will be next treated upon.

MODELS FOR DRESS AND FROCK;

ACCORDING TO THE FORM OF THE FIGURE, ABNORMAL IN DIMENSION.

A, EXPLANATION.

¶ 22.——The form of the human figure, if abnormal in dimension, is known through the differences D^{-}; D^{+}_{I}; and D^{+}_{II} on the measure, see paragraph 10 mensuration. Hence, if we have a measure showing according to paragraph 8 that $h = b$, and in the same time in paragraph 10, that a positive difference D^{+}_{I} exists of the first degree, or in other words a first increase; then we have the form:

$$h = b;\ D^{+}_{I},$$

according to which the model to the human figure can be constructed, which agreeing with the form of the figure is termed a proportionate and abdominal model of the first degree. But if, according to the two paragraphs 8 and 10 in mensuration, we have $h = b$, and in the same time the positive difference D^{+}_{II} of the second degree, or in other words a second increase, then the form is:

$$h = b,\ D^{+}_{I},\ D^{+}_{II},$$

and according to the model which is to be constructed, agreeing with the form of the figure, is termed a proportionate and abdominal model of the second degree. It must here be observed that when a second positive difference D^{+}_{II} occurs, while there is already a first positive difference, D^{+}_{I}, the construction must not alone be with D^{+}_{II}, but D^{+}_{I} and D^{+}_{II} taken together constitute the form as given above.

Lastly, if the measure shows that the form of the figure has a negative difference D^{-}, in the size of the waist, and is determined through $h = b$, and D^{-}, then the construction form is:

$$h = b,\ D^{-},$$

after which the model is to be constructed, and which, according to the form of the figure is termed a proportionate and negative model.

¶ 23.——These three cases of the variable differences, D^{+}_{I}, D^{+}_{II}, D^{-}, which, have been considered in the preceding paragraph are presented not only in the proportionate form $h = b$, of the human figure, but they also occur in the broad form, $h < b$, and in the slender form $h > b$. Hence there are still the following construction forms;

first, $h < b,\ D^{+}_{I}$; $h < b,\ D^{+}_{I},\ D^{+}_{II}$; and $h < b,\ D^{-}$.
second, $h > b,\ D^{+}_{I}$; $h > b,\ D^{+}_{I},\ D^{+}_{II}$; and $h > b,\ D^{-}$.

according to which models can be constructed.

These include all the cases which can occur in the size of the waist of the figure, and in the construction of models are termed abnormal in dimension.

It is not necessary to give examples through constructed models of these cases of the differences in the three forms $h = b$, $h < b$, and $h > b$; but it will be sufficient to exemplify them through models, on one of these forms only. As the form $h < b$, may be always taken as an example with more advantage than either of the other two forms, if we show the cases of the differences of the abnormal forms, so this form $h < b$ is especially chosen through which to give examples of the differences in the models, and the student will find no difficulty in laying down the two remaining forms for himself.

B, CONSTRUCTION.

¶ 24.——The measures which fix the units belonging to the form in construction need not again here be fully described, having been already given in the article on mensuration, but still they accompany each model. Pl. 8, fig. 1 shows one of these measures, and the construction form from it is as follows;

a) $$h < b,\ D^{+}_{I},$$

and which after the form of the human figure is termed broad and abdominal of the first degree. The construction of the models according to the form, $h < b$, has also been treated of in paragraph 18, and there only remains D^{+}_{I} to explain. We may farther, as in paragraph 18, take the proportion measure in its ground length equal to 56 inches, and in the same time the breast measure 21 inches. In this manner we must take the real size of the waist (R) which is not larger in size than C I, as the breast measure C D shows, but which must be larger than C *o* on the same measure, as shown by C D. The difference of the real size of the waist $A\,B = R$, and the normal size of the waist $C\,o = N$, is here $F\,G = D^{+}_{\mathrm{I}}$.

Now we take $\frac{3}{4}\,D^{+}_{\mathrm{I}}$, of the whole difference D^{+}_{I}, and add that quantity to the front of the forepart of the model, (fig. 3) in the size of the waist, so namely that $F\,G = \frac{3}{4}\,D^{+}_{\mathrm{I}}$; the remaining $\frac{1}{4}\,D^{+}_{\mathrm{I}}$ add behind in the size of the waist, so that $C\,B = \frac{1}{4}\,D^{+}_{\mathrm{I}}$, as is sufficienty shown by the figure 3. We proceed in a similar manner with fig 5, hence no farther explanation is required. This is a model of the same kind of form as fig. 3, with the exception that it is long in the style of the waist, already treated of in paragraph 17.

Pl. 9, fig. 1 shows another of these measures, according to which the construction form is as follows:

b) $h < b,\ D^{+}_{\mathrm{I}},\ D^{+}_{\mathrm{II}},$

and after which the model on pl. 9 is constructed, and agreeing with the form of the human figure, is termed broad and abdominal of the second degree. As this model in respect to the form $h < b$, is the same as that on pl. 8, there is here also but D^{+}_{I} and D^{+}_{II} to be considered. The measure also, fig. 1, pl. 9 is the same as that on pl. 8, with the exception only that in fig. 1, pl. 9, the difference is $H\,G = D^{+}_{\mathrm{II}}$, of the second degree, which was not the case in the other measure.

To add the difference D^{+}_{I} and D^{+}_{II} correctly to the normal size of the waist on the model we proceed as follows: when the construction of the model, fig. 3, pl. 9, is brought so far as the line D B, then put the real size of the waist A B (fig. 1) on the breast measure C D to mark the extent of the difference $H\,G = D^{+}_{\mathrm{II}}$; then take $\frac{1}{2}\,D^{+}_{\mathrm{II}}$ and make $A\,B = \frac{1}{2}\,D^{+}_{\mathrm{II}}$ (fig. 3), and in the same time add in front to the normal size of the waist $\frac{3}{4}\,D^{+}_{\mathrm{I}}$, and $\frac{1}{2}\,D^{+}_{\mathrm{II}}$ to it; so namely $L\,M + M\,N = \frac{3}{4}\,D^{+}_{\mathrm{I}} + \frac{1}{2}\,D^{+}_{\mathrm{II}}$, and make $L\,O = L\,N$; now draw D C, and erect upon it in D under a right angle the line E D, and finish the construction E F G, and E H. Lastly, make $H\,G = \frac{1}{4}\,D^{+}_{\mathrm{I}}$ and we have completed the construction of the model. Fig. 5 is proceeded with in the same manner, with the exception that here $M\,P = M\,O$, and $P\,Q = \frac{1}{2}\,h$; because a long style form is in proportion shorter in the front than a short style form; as the drapery otherwise assumes in the front on the figure a heavy and dropping appearance, and ill becomes the figure, especially if it is positively abnormal.

Pl. 10, fig. 1, shows a third measure giving a construction form as follows:

c) $h < b,\ D^{-},$

and according to which the model on pl. 10 is constructed, and which after the form of the human figure is termed a broad and negative model in form. As this model is again in respect to its form, $h < b$, the same as those in the two other preceding plates, we have but D^{-} to dispose of, and also the measure is the same as in the two preceding cases, with the exception that here is a negative difference $F\,G = D^{-}$, whereas the difference in the two former measures was positive.

To deduct this difference, D^{-}, correctly from the normal size of the waist in the models, we proceed as follows: When we have come so far with the construction of models, fig. 3, pl. 10, as to reach the point A, then first place the real size of the waist $A\,B = R$ (fig. 1) on the breast measure C D, to observe how large the difference, $F\,G = D^{-}$, is, and then make (fig. 3,) $A\,C = \frac{1}{4}\,D^{-}$; further draw D C and erect upon it in D the line D E under a right angle; draw E H I; make $I\,K = \frac{1}{2}\,D^{-}$, finish E K, and make lastly $L\,M = \frac{1}{4}\,D^{-}$. Fig. 5 is proceeded with in exactly the same manner as explained in fig. 3, and therefore for this reason nothing farther is to be remarked, than that the model is of a long style form, which has been already treated upon.

¶ 25.——It is perhaps superfluous to give a second example of the negative difference; but it is better to present one more, than one less than sufficient. Thus fig. 1, pl. 11, shows a measure according to which the construction form is as follows:

$h > b,\ D^{-},$

after which the model on pl. 11 is constructed and is termed, according to the form of the figure, slender and negative. As this model in respect to the form $h > b$, in ¶ 20 is treated upon, we have here to place D^{-}

as above. The measure also fig. 1, pl. 11, in respect to the size of the waist is the same as that just treated of in ¶ 24 under *c.*) therefore in this model all farther explanation is unnecessary, and to represent the measure and model on the plate is quite sufficient.

The construction of those models which are not given is also equally easy; namely, those according to the construction forms $h > b$, $\mathrm{D}^{+}_{\mathrm{I}}$; and $h > b$, $\mathrm{D}^{+}_{\mathrm{I}}$, $\mathrm{D}^{+}_{\mathrm{II}}$, in ¶ 23, second case; and farther those under ¶ 22, $h = b$, $\mathrm{D}^{+}_{\mathrm{I}}$; $h = b$, $\mathrm{D}^{+}_{\mathrm{I}}$, $\mathrm{D}^{+}_{\mathrm{II}}$; and $h = b$, D^{-}, according to which the student can easily construct the models himself.

It may lastly be observed that when we term models slender, broad, or proportionate, and no difference occurs in the size of the waist, that such are normal in the size of the waist, and in this the difference is *o*; and farther if a model is simply termed slender, broad or proportionate, it is always considering its length in relation to its breast measure; similarly as in Anthropometry the height of the human figure is only in relation to its thoracial circumference, when termed slender, broad, or proportionate. In general, all that which is true of the external form of the human figure, must also be true of the form of the models.

C, PLACING OF THE PARTS OF THE MODELS.

¶ 26.——After we have constructed, according to ¶ 16, the hind part of the model, and proceeded so far with the forepart as instructed in ¶ 16 and 17; then we place the hind part (fig. 2, pl. 12,) with its acromial point A in the acromial point A of the forepart, so that the levator line A O of the back part falls in the levator line A B of the forepart, and the levator vertex, O, is fixed. Now draw the parabolic line M O D, and in the same time another line M C D, so that $\mathrm{C\,O} = \frac{1}{4}$ unit (*u*). The parabolic line M O D is exactly the form of the human figure on the superficies in the collumial section, if the surface lies in a plane; but as something is always worn round the neck, as a cravat, the collumial line M C D of the model must be larger than the same line M O D in nature; hence the reason of this alteration. In this position of the hind part to the forepart, the style line E finds its place by itself, and there needs only the shoulder line F of the forepart to be so drawn, that both lines on E and F, in the middle of their lengths, lie so far asunder as $\frac{1}{4}$ unit, uniting at the ends, as the figure shows.

Second, place the scapula point G of the back part in the scapula point G of the side part, so that the two scapula lines M G and G I lie in a straight line M G I; afterwards draw the line H I A, and the line H K; and make $\mathrm{K\,L} = 2\frac{1}{4}$, if the style is short, but if long only $1\frac{3}{4}$ as directed before, in ¶ 17.

Third, in figure 3 keep the hind part fixed in the scapula point G, and move it round this fixed point G, with the point K of the back part in the point L of the side part. Holding the parts of the model fixed in this position, draw first the side line N *i* M K, remove the back part, and then draw the side line H *i o p q* of the side part, draw *q l m n*, and the required object is attained.

Particular attention must be given that the back part in *o i* N must not be too contracted in joining with the side part *o i* H. And also, (fig. 2) H I is to be held rather easy on the sleeve, and I A to be held tight; but A P must again be held easy. The style line also E P of the back must be held slightly easy, and the shoulder line F P of the forepart somewhat tight; the collumial line M C D in the direction of C held tight, and the collar part here kept easy. The facing also must in this place be rather large: because the human figure is here from the axilla to the neck, in the levator vertex, concave; but towards the front in the sternal end, the forepart must be kept a little easy to the collar part. In general by placing together the parts of the model, it is similar to placing together the surfaces which are developed from geometrical bodies, and which surfaces by being joined are always according to the nature of the convexity and concavity of the bodily form, and according to the nature of the lines or curves in the surface.

¶ 27.——What little is to be said of the construction of the collar part of the model may stand suitably in this place. On plate 5, figure 4 presents the collar part, the proportion numbers of which accompany the ground lines, (co-ordinates); hence there is no difficulty in the construction of this part. But it must be correctly understood, that the angles C E F, and H E G, are always right angles, the position of which is fixed to one another through the acute angle G E F. The surface of the collar part, where the angle G E F lies, becomes larger than it would be were the two right angles placed by the side of each other in a straight line. This must be so, because the surface in A E and E H is laid over, and further, that the end A is bent towards the end H, when the finished dress is placed on the human figure, thus producing a double curvature of the collar part, hence making such position of the angles necessary. This rule applies to the three kinds of collar parts presented on the remaining plates.

As in practical application, the lappel part joins to the collar part of the model, a few words are to be said which may follow here. On plates 6 and 7 are two lappel parts, one being given to each forepart of the model. There is drawn, in this part, a dotted straight line, which is made the length of the forepart in the front, measured straight, without the skirt, if a frock, and if a dress, as long as the forepart, including the skirt strap. The side of the lappel joining to the forepart must be straight as the dotted line, or only very slightly convex, as the full drawn line running by the dotted line shows. The curvature on the forepart must be held so easily to the lappel part, that both, in putting together, come in a straight line.

D, SLEEVE AND SKIRT PARTS.

¶ 28.——The construction of a skirt part of the model is always the same, whether the model belongs to a proportionate, broad, or slender human figure, or whether normal or abnormal in dimension, or normal or abnormal in position; the difference of the skirt part being only that of costume, as for instance, whether it is for dress or frock. On plate 12, figure 5 are two ordinates, A B, and B D, under an angle $A\,B\,D = 107^\circ$, which is the ground work of every dress skirt part. Farther, $B\,E = \frac{1}{2}$ or $\frac{3}{4}$ unit of the measure, figure 1; $C\,E = q\ l\ m\ n$ (see also figure 3); $C\,D = 1\frac{1}{4}$, which is added to C E for ease on the hip. The $D\,o = 1$ fixes the position of the curve *o* E, and the line E A is drawn by free hand. Those lines above D, and below *o* are drawn only in cases, where as much as they lie higher or lower than *o*, are again, in the front of the forepart of the model, to be deducted from or added. The dress skirt of the model on plates 3, 4, 6, and 7, are always so constructed, and need no further explanation.

It is with the frock skirt part exactly as with the foregoing, and one example will suffice for every case. Plate 12, figure 4, shows a frock skirt part. Draw a straight line P C, and make K L equal to the breadth of the lappel; farther, make $K\,B = \frac{1}{2}$ real size of waist (R), take a point, E, D, or C, in the line K C, as high as the quantity that the skirt surface is intended to be more or less full. Now draw the curve, say K F, out from the point C, and make $F\,B = B\,K$. But the curve, F L, from the B towards L, must be drawn by free hand, rather more straight than the circle gives it, otherwise the skirt part in the front would fall too full on the figure. Next place the side part of the model on the skirt part, and draw O F with the side line running with it in one direction. This proceeding is a precedent for other cases, when the curves K H and K I are drawn out from E, or from D, or from other points in K C which may be chosen.

There is another mode of drawing the skirt curve, but which is not so generally applicable as that just described and which is only of practical use when a small quantity is required in the skirt surface. This is to make $A\,K = q\ l\ m\ n$ (figure 3), and then take the point F out from the point A as high as the quantity that the surface of the skirt is to be. But this rule requires to be limited, and we can, correctly speaking, only say: make $A\,F = 3$ high, not more, although it may be less. Next draw the curve F K out by free hand. With the line O F we proceed just as in the first method. In the manner last described, all frock skirt parts in the foregoing plates 2 and 3 are constructed, hence it is not necessary to repeat the explanation.

¶ 29.——The sleeve parts of the model somewhat differ from each other in their construction, according as the model belongs to a broad, or either of the two other forms of the human figure. Plate 6, figure 4, shows a sleeve part belonging to the slender and proportionate model; it is the same in each of these two forms, with the exception that the elbow length of the slender form is in proportion larger than that for the proportionate form; but such is always determined by the measurement. It is, therefore, principally to be observed to fix the following proportions, namely, $A\,C = 10$, or $A\,C = 10\frac{1}{4}$, as the sleeve part shows on plate 2; or when the human figure is round in the back, then make $A\,C = 10\frac{1}{2}$, or even $10\frac{3}{4}$. In the slender form all these units must invariably be taken from b, and never from h. In the proportionate form, naturally, h is not to be distinguished from b, because in this case $h = b$, as already is known. When the point A (figure 4, plate 6) is fixed, then draw a perpendicular A E upon A C in A, and as C B is equal to the style breadth of the hind part, carry from B, out towards E, the half arm-hole circumference ($\frac{1}{2}$ axillar line circumference), so that B E $=\frac{1}{2}$ of the axillar circumference. Farther, take the half B E in F, erect in F, upon B E, a line F G, and make F G $=\frac{1}{2}$ B F. Out from the point G, as a centre, draw with the distance G B a curve, B H E, go inwards at D as much as $1\frac{1}{2}$, and finish the sleeve part as the figure shows.

Should the sleeve part belong to a broad model, the course of proceeding is generally the same as that just described, with the difference that the quantities are taken partly from *h* and partly from *b*, as seen by the figure 5, in plate 5. It is necessary to avoid confusion with the two points D and B; because by the previously named sleeve parts they (D and B) fall together in one. To be quite clear in this matter, it is only needful to consider that always A D + D C = A C, wherever the point B of the back part may lie.

We have now considered all the parts, which, when put together, constitute a model of dress or frock. We have besides considered, all kinds of forms of dress and frock, according to the different kinds of forms in the human figure, in respect to dimension; consequently the construction is accomplished which was determined in the commencement.

ON VARIATION.

MODELS FOR DRESS AND FROCK.

A, ACCORDING TO THE FORM OF THE FIGURE IN RESPECT TO POSITION.

¶ 30.——The variations of models are of two kinds, the first is made according to the position which the human figure has; the second according to the style of the costume which clothes the figure. The variation of style in the costume is considered in the article on style, but here we will first treat of the variation of the models according to position. And just as the construction of models in their dimension form was only made according to the dimension form of the human figure, so the variation of the models is always with regard to its position. And as farther the positions in all dimension forms are the same, so it is the same thing whether the one or the other kind of dimension form is chosen on which to give examples of the variations of the models. Hence such may be done on that form of model which originated under the construction form, $h = b\,o$, and therefore, the reason of the measure, fig. 1, pl. 13. But it must be remembered that the dimension form of the model, under the preceding division on construction, must still be constructed according to a certain position, which is according to the normal position of the human figure, as already in ¶ 15 has been described. Such a model of normal position, is that which lies between the inclined and the straight model, see fig. 3, pl. 13.

When a model which lies in a normal position is varied, it must be done according to the abnormal position of the human figure, such varied forms being shown in the straight and inclined models in fig. 3; then where the position is normal, the position difference is equal to, $o\ (d\,o)$, that is, there is no difference existing. But where there is an abnormal position there must always necessarily be a difference between that, and a normal position; something at least, however large or small it may be, for instance, $d\,x$, $d\,y$, &c. &c., where $d\,x$ as well as $d\,y$ present an increase of a quantity, and $-d\,x$, and $-d\,y$ the decrease of that quantity: d is no quantity, but merely a sign placed before the quantities $x\ y$, &c., to remind that these quantities are differences; and the stroke (—) is a sign to denote in the same time that the quantity $-d\,y$ is opposite to $d\,y$, as D B, B C, on A B in fig. 2 show, where A B denotes y, and instead of $d\tfrac{1}{2}$, $d\,y$ is substituted. Consequently in the same manner as dimension differences exist, so also position differences exist; and these latter are actually the elements through which we vary the model as will soon be shown. But before going so far the following is still to be observed:

When the human figure is small in the back, it may be supposed that the forepart of the model must be inclined, and deviating from that forepart in a normal position (see fig. 3, pl. 13), so namely that the surface contents of the model in the back become less than such in the normal position of the model; and farther that the levator vertex, V, approaches nearer the scapula point (scapula vertex) F, than these points lie to one another in the normal position; also that its altitude in this case, is less, and at the same time the altitude of the infra spinatal point O is less, than in the normal position (R); compare the levator vertex, V of the inclined, with that of the normal model, which lies in the middle of the two vertices V and V′. Through this variation the diagonal V E F, as well as the surface of the model in its contents, become less than the diagonal and surface contents when in the normal position. In the reverse: when the human figure is large in the back, the forepart of the model must be straight, deviating from the forepart in its normal position, as fig. 3 shows; so, namely, that the surface contents of the model in the back, becomes larger to it than when such was in its normal position; and farther, that the levator vertex, V′ is farther removed from the scapula vertex, F, than these vertices in their normal position lie to each other; also that its altitude is larger as well as the altitude of the infra spinatal point N, than when these points held their normal position, (R); so namely that in this case, if the diagonal V′ E F is drawn, it is larger than it would be through the vertex in a normal position; and hence also the surface contents of the straight model is larger than that of the normal.

It must farther be considered that in these variations the circumferences of the three models remain equal to, although their form as well as surface contents are different from each other; for as much as one part of the figure becomes less, just so much the other wins, and the entire in its circumference remains equal to itself: because there is no variation in dimension, but merely in position conditioned. With this short introduction to the variation of the models it will be found very easy to undertake them.

¶ 31.——When now the human figure is larger in the back through its position, than it would be normally, the model constructed to the normal position must be varied, so namely that it harmonizes with the abnormal position of the figure, large in the back. But being large in the back is not a simple, but a complex condition consisting of *shoulder forward*, *back long*, and *thorax inclined forward* on the pelvis in the iliac region. Hence we have to observe the three following differences: namely the B C $= d\,\frac{1}{2}$ in the shoulder (the acromial difference), which the scapula spine line A B on the back part fig. 5 shows; farther the sines (scapula differences) F G $= \frac{1}{4}$, and F H $= \frac{1}{4}$ in the angles G E F, and F E H, fig. 3; or if we do not use the differences G F and F H, the hind part in the normal position F E may remain, and only the indentation line M I is made as much as I K $= \frac{1}{2}$ larger, and afterwards the infra spinatal point N placed as much as $\frac{1}{4}$ higher and more forward, than the normal line P Q lies. But the most correct method is to put the scapula vertex F of the back part in the scapula vertex G of the forepart, to find the point N; and to find the point K, to put the scapula vertex F of the back part on the scapula vertex H of the forepart, and in this position of the back part to make the indentation only as great as its normal quantity shows in the article on Construction. Lastly, as large as I K is on the side part behind, must be S T in the front on the forepart, and in the same degree that the side part in the iliac region K becomes smaller in breadth, and greater in length, the forepart also becomes larger in breadth in the front, and less in the length, as S T = I K shows.

The pointed lines X Y and X Z on the shoulder fig. 3, are identical with the A D and A C of the back part, when the acromial point D, and C, in the acromial point X of the forepart is so placed, that the levator lines D L and C L, fig. 2, lie in the levator line X V of the forepart.

As the angle G E H is always equal to the angle b E a, so are the openings G H and $b\,a$ also equal to each other, if the legs are of equal length, as G E = E a, and H E = E b; hence it is clear that the quantity of the sines G F and F H always influence the length $b\,a$ of the breast part, which is worthy to be observed, so as not to fall into the error that it is indifferent whether the sines G F and F H are less or more in quantity, but well to consider, that they must have a fixed ratio to other differences.

That a scapula difference is only equal to $\frac{1}{4}$, when an acromial difference equals $\frac{1}{2}$ need not surprise; the cause being that E F is only half as large as E V, and also only half as large as F I. A still further explication of the nature of the variable physical quantities comes under Anthropometry, which subject, treated in the abstract, belongs to pure mathematics.

¶ 32.——But when, opposite to this, the human figure in an abnormal position is smaller in the back than when in its normal position, the proceeding in the variation of the model is the same as above. There is in this case as in the former the same number of differences, namely those which arise from the *shoulder back*, *back short*, *thorax inclined backward*, on the pelvis in the iliac region, only with the exception that these differences are opposite to the quality of the foregoing. For instance (fig. 6) the scapula line A B shows the acromial difference B D $= -d\,\frac{1}{2}$; for A B here decreases, in the same manner as in the above case fig. 5, the A B increased $\frac{1}{2}$ unit. Farther there are also the sines F G and F H of the angles G E F and F E H to be observed (fig. 3), when the back part is placed to obtain the infra spinatal point O, which is done by placing the scapula vertex F of the back part in the scapula vertex H of the side part; and to obtain the infra spinatal point L place the scapula vertex F of the back part in the scapula vertex G of the side part, and make the indentation quantity as large as that taken in the normal position of the parts. But if we leave unobserved these scapula differences, $G F = d \frac{1}{4}$, and $F H = d \frac{1}{4}$, and proceed less exact, the back part may be left in its normal position, as F E shows, and only the small portion $R O = \frac{1}{4}$ lying below the line P Q be taken away, and in the same time take the indentation quantity M I as much as $L I = \frac{1}{2}$ smaller. It is now quite clear that the scapula line W F of the back part must always be in a straight line with the scapula line of the side part, whatever may be the position of this line F E, namely as G E, or as H E. The forepart will here again be disposed of as before; namely, in the same degree that the side part in the iliac region becomes larger in breadth and smaller in length, so will also the forepart in the front be smaller in breadth, and larger in length, as $T U = L I$ shows. It is important to observe that although the acromial differences are always double as large as the scapula differences (and hence is $d \frac{1}{2}$ and $d \frac{1}{4}$), in both these cases of variation, the altitudinal differences in the vertex V of the levator scapula, and the infra spinatal point R, remain equal to each other.

¶ 33.——Comparing, lastly, the two cases large and small in the back, with each other, it is seen through the foregoing proceeding that in the first case F E is in effect cut up for the insertion of the wedge G E H; opposite to this, that in the second case, as if the wedge G E H were taken out, and G E and H E joined in a line. As now such putting in and taking out is of no practical avail in constructing a model, the variation as instructed, must be adhered to. But the entire quantity that the back is shortened or lengthened does not lie in the scapula region alone, as the half lies in the iliac region, on account of the backward or forward inclined position of the thorax upon the pelvis; hence the shortening in the one case, and the lengthening in the other, of the side part of the model in L, I, K, in the same time that such was done in the scapula vertex (see fig 3). On the hind part the entire shortening or entire lengthening of the back is always taken from, or added to, the normal back length, as G C is taken off in fig. 6, and D G added in fig. 5. The differences G C and D G (figs. 5 and 6) are easily found, by placing the natural back length on the normal back length (see for instance fig. 2). Here is K G the normal back length, and K I as well as K H the natural back length, hence I G is a difference in the iliac region, when the human figure lies backward in the thorax, and G H is a difference when the thorax lies forward upon the pelvis. The same with the figures 5 and 6. In figure 4 in the back part there is nothing to be observed, because the normal, is equal to the natural or real back length. Farther, through the variation above described in the scapula vertex, or otherwise through the variation of the infra spinatal points (side points of the side part) the back part regulates itself, so namely, in length to the side part, that this half shortening, as well as half lengthening, falls, or is carried to the scapula region G H.

Farther, although the style part of the back is, in the form of a varied model to be taken at liberty, still for greater distinction it is to be recommended to the commencer, to keep so far to the original form of the model in its normal position, as the heights of the two points of the back part between the parallels A B and C D show (fig. 4), and hence the parallels are drawn in all the back parts. The breadths also $E F = 6\frac{3}{4}$ of the style form of the back part are always drawn first, after which add, as the variation requires $6\frac{3}{4} + d \frac{1}{4}$, or deduct, as $6\frac{3}{4} - d \frac{1}{4}$. As an example, fig. 6 is small in the back, and fig. 5 large, as figures 2 and 3 make more clear. But whether the style form of the back part is altered or not, it is immaterial to the fit, when only the ground work is correctly varied according to the differences above described; still taste requires the correction of the style form.

As the student will now by himself be able to construct the cases in fig. 3 separately, in a similar manner as figure 2 is separately constructed in figures 4, 5 and 6, he may proceed to the remaining cases of variations.

¶ 34.——The normal form of the models in pl. 14 is constructed to the accompanying measure, fig. 1, which calls for no extended explanation in this place; but the variations are especially to be observed. Those of the models in figures 2 and 3, are made according to the condition, that first, the human figure is high, and second, that it is low in the axilla. First, when the human figure is high in the axilla, we take, as in fig. 2, the normal quantity A B larger than it is; that is, allow it to increase as much as the quantity A C, or according to that degree which the human figure more or less may require. For instance, as the increase A C = ½ unit of the proportion measure, fig. 1. But as much as A C is an increase of A B, must D E be increased also, namely that D F = A C. Now F L must be drawn, and also the style form C G H corresponding to the new ground work. Next in fig. 3 increase the normal quantity A B, so that the increase, A C of this quantity equals A C of fig 2 ; then draw in the same time H G. If each acromion L and G, and the levator lines H G and L F of the two figures are placed in one another, as described in the article on placing, ¶ 26, the position of the acromial line E F, in fig. 3, comes by itself. Second, if the human figure is low in the axilla, fig. 2, the normal quantity A B decreases, say, as much as A I = ½ unit, but in the same time D E must just so much decrease, that D K = A I ; draw in the same time K L, and also the style form I M H, to harmonise with the new ground form K L. Now let in fig. 3, the normal A B just as much decrease, that A I = A I of the figure 2 ; draw D G ; place the acromion points L and G, and the levator line K L and D G one in another, according to the rule given in the article on placing, so results by itself the position of the collumial line K B.

¶ 35.——Among human figures there are forms, which although straight in the upper part of the thorax, lie more forward in the lower part in relation to the upper, than they do in the normal form. The best way to vary a model of this form, as fig. 3 shows, is, to vary the normal side line in the abnormal L M, and afterwards for this deduction from the side part to add as much in the forepart in the front, as seen in O P. The model may also in the same time in the side, be drawn as Q R and Q S show. This quantity may be taken larger, according as the human figure from side to side in the iliac region and hips is more or less large. It often occurs that the human figure is very large from side to side, and in the same time very small from the back to the front. Should there be a case that the figure is both very projecting in the scapula region L, and in the iliac region R S, and the rules for the variation as above described not be observed, most certainly the other parts of the model, through such a form of the figure will be disarranged. But with the observation of these rules, not only will the fit, as well as comfort be attained, but also taste in the drapery of the figure. Then, should the model in M be too large, and too small in L and S, not harmonising with the form of the figure, there will be a fold in the drapery from S to L, which will destroy all the beauty of the figure, because the fold prominently shows its fault.

¶ 36.——When the head of the human figure is inclined forward, the model is to be varied, as fig. 4 shows ; namely, take the normal A B as much as B C = ½ unit larger, and draw the collumial line C V D through the vertex V. The point H must *not* be taken off from the shoulder, which is sometimes erroneously done, but remain unaltered as it results from the variation: because the C V is already smaller than its corresponding normal B V. Also the entire length C V D to the entire length of the normal B V E remains equal ; as the condition of the variation is according to the position, and not according to the magnitude of the collumial line.

In the case of the head being inclined backward, the variation of the normal B V E is made as F V G shows. Also here the varied F V G of the normal B V E remains equal to itself in the entire, although the parts vary just as before, namely that F V here becomes larger, and V G smaller, and for the same reason, that the position only, and not the quantity of the collumial line is varied.

¶ 37.——On fig. 4 it is shown in the same time how the model varies when the hips lie higher, and when they lie lower in the human figure than their normal place admits. If the former, draw the line I K through the normal point L, parallel with the line M N, and take the point I as much higher above L, as the difference, I L, between the normal and the abnormal position of the hips requires. The difference I L is certainly more than ½, but at most ¾ of the smaller unit of the proportion measure. It is similar when the hips lie lower than their normal position in the human figure admits. In this case the point K is the place on the model which is determined through the difference L K = ½. In the first instance when the hips lie high, draw the line O I ; in the second, where they lie low, draw O K, and the normal place L of the model is varied according to the given condition. Just as we proceeded with the side part behind, so we must proceed in the front with the front part, in P, as Q R and S R on fig. 5 show. Lastly it is by itself plain, that after these points are determined, the curve from behind to the front out of I and K (fig 4) must be drawn concentrical with the normal curve L N P. This variation is especially observed, so that the parts of the models in the iliac region shall remain in their normal ratio to each other, and that the harmony of the model with the human figure may be insured.

If in some particular costume the model shall be made longer in the front, and remain unaltered behind, or the reverse, longer behind, and unaltered in the front, independent of the form of the human figure in respect to the hips being high or low, then the skirt part undergoes a variation according to that of the model in the body part; with this exception the skirt part remains unvaried, through all the variations of the body part. But this is treated of in the style part on costume.

¶ 38.——When the human figure is high in the shoulder (acromion), keep the hind part fixed in the vertex V, and let it move round this point out of the position V A, into that of B V, so namely that the difference $AB = \frac{1}{2}$, and the shoulder surface takes the position C D E. Now draw E F nearly $\frac{1}{4}$ higher than the normal E H lies, and the condition is completed as shown in fig. 5.

When the shoulder (acromion) lies low (fig. 5) hold also the back part fixed in the vertex V, and cause it to move in this point V, out of the normal position A V, in the abnormal position I V, just as much as the difference, $AI = \frac{1}{2}$ is large, and the position of the shoulder surface K L N is obtained; but also in the same time the normal E H G must be altered in the abnormal M H N, as the difference $EN = \frac{1}{2}$ determines; and that also the difference $GM = \frac{1}{2}$, and the height of the point G so much sinks, that the point M lies $\frac{1}{4}$ lower than the point G. This altitudinal difference of $\frac{1}{4}$ must not be regarded as an insignificant element: because such belongs to the uniformity of the varied model. Lastly, the normal O G must be altered in the abnormal M P, and as much as the difference $PO = \frac{1}{4}$ determines. It may also by this variation be brought in mind, that it is not the magnitude of the axillar line, but its position only which should be varied according to the position of the shoulder, hence showing this proceeding to be correct.

The student will now be able to construct all these cases separately. And it is believed he can, unassisted, treat complex ones also. As for example where the construction of a model falls under the condition: high in the axilla as figures 2 and 3 present, and in the same time low in the shoulder (acromion). This is a very material case, and to construct a correct and beautiful model of this kind, would prove that the student besides being an artist, is a man of scientific knowledge.

B, THE FORM OF THE MODELS IN RESPECT TO STYLE.

¶ 39.——In this article it is intended to consider the human figure normal in form, which shall be, in this especial example, in the same time proportionate, and remain unalterably fixed in form, during any variations that the style form of the model may undergo. It is now the question how a model is to be varied so that it shall be fitting, as well as tasteful to the figure. But before proceeding to this variation, we must remain a moment to consider one or two points, which will serve to lead us to the undertaking:

Namely, when a measure is taken from the human figure, both behind and in the front, from the vertex of the levator scapula, beginning longitudinally and perpendicularly upon the thoracial line (places which are known from the Anatomy, Introductory to Anthropometry) then it is found that these two lengths in a figure perfectly straight or upright (normal in position) are equal to one another. If these two lengths (quantities) are also taken with the units of the proportion measure of a proportionate figure, each of the two quantities, posterior as well as anterior, equals $8\frac{1}{4}$ units. These quantities now determine the height (altitude) of the vertex of the levator scapula; and hence such must also be true of the models. But this is better illustrated by the model fig. 1, pl. 15; namely, A B is the levator line, which is intersected by the collumial line C V D in the vertex V.

Now place the hind part with its vertebral vertex, in the vertex V of the forepart, so that the back line V E of the back part, lies parallel with the ground line D F of the forepart, and that in the same time the infra spinatal point H of the back part is turned towards the infra spinatal point G of the side part: thus we see that V I of the hind part, equals V I of the forepart, and the vertex V is the altitude of both quantities. Farther, according to Mensuration, $VI = 8\frac{1}{4}$, hence also is the altitude V equal to $8\frac{1}{4}$. And lastly, the hind part V I stands in relation to the forepart V I as $8\frac{1}{4}$ to $8\frac{1}{4}$, equal 1 to 1 (abbreviated, $VI : VI = 8\frac{1}{4} : 8\frac{1}{4} = 1 : 1$). As now the point G lies equally high with the point H, and we prolong G H perpendicularly upon V I in K, then is $KI = HL$; therefore we need only to compare the quantity

V K of the hind part with V K of the forepart, when the position to one another of the infra spinatal point G, with the vertex V shall be examined. Under these circumstances the altitude is normal in quantity, and the altitudinal difference is equal *d o*.

¶ 40.——If it is now intended to vary a model upon the consideration of style, the posterior and anterior altitudes of the vertex, with which we are now sufficiently acquainted, not only remain unvaried in their ratio, but also they remain unvaried in quantity, by the alteration. See fig. 2, for an example of the normal shoulder style varied into a straight shoulder style. The hind part belonging to this shoulder is not to be varied. To obtain through variation a straight style of the shoulder, when in the same time the axillar line, and also the collumial line become smaller than the corresponding normal lines, it is only necessary to decrease the normal vertex line G B, and thus there is B D = $d\frac{1}{2}$; in the same time decrease the normal clavicular line A H, and then we have the difference A C = $d\frac{1}{2}$; draw C D. Place now the hind part as usual, but with its acromial point in the varied acromial point C of the forepart, and the straight shoulder is obtained, deviating from the normal shoulder, according to the amount of the acromial difference, and vertexial difference. Remember that the two differences are equal to one another, which is always the case in this variation.

The proceeding is the same but in an opposite direction, when the oblique style of the shoulder is required; namely, the normal B G, as well as the normal A H increases, and the difference B E = $d\frac{1}{2}$, is equal to the difference A F = $d\frac{1}{2}$. The maximum of each of these differences is commonly only $\frac{1}{2}$ unit, and the minimum always more than *d o*, that is more than nothing. The altitude is unaltered in both of the variations, as O L, and M I, and especially the line P Q, which goes through the three vertices, show.

But now as was required in the straight style, the axillar line I C K, and the collumial line L H, have become smaller, and in the oblique style these lines M F N and O H larger than the corresponding normal lines, so is the knowledge of such variation of great practical use; for through the receding and forward position of the shoulder, we can not only find the proper quantities of these lines, but also the different and suitable diagonal lines L K and O K. It must be by itself evident that, when a shoulder is too straight, the diagonal L K becomes too large, and the axillar as well as the collumial line too small. The consequence of this would be an especial fulness in K, and a contraction in the acromion C, and in the neck. The reverse, when a shoulder lies too oblique, the diagonal line O K becomes too small, and the axillar as well as the collumial line too large; the consequence of which is again, that the model in K can become too small, when in the same time in the neck, and the acromion F it would be too large. For this reason we do not take the differences either on the positive, or on the negative side larger than $d\frac{1}{2}$.

¶ 41.——See figures 3 and 4, where the shoulder is varied into the straight and the oblique styles: but which is under the condition that the axilla line shall remain unaltered in magnitude; and that under this variation the altitudes of the vertex shall remain unaltered also.

To make a variation according to this condition, let the scapula spine line of the back part decrease, the same quantity as the clavicular line of the forepart is increased, when the shoulder is to be oblique. And the reverse, in the case of a straight shoulder, make the scapula spine line increase in the same quantity as the clavicular line of the forepart is decreased. But in the same time that the clavicular line increases or decreases as much as $d\frac{1}{2}$, the vertexial line increases or decreases as much as *d* 1. For instance, in an oblique shoulder, let the normal ordinate A B decrease so much as the difference B C = $d\frac{1}{2}$; increase the normal ordinate E F as much as the difference H I = $d\frac{1}{2}$, and increase also the normal I K as much as the difference I M = *d* 1; lastly, place together as usual the back and forepart, but with their varied acromia, and the required shoulder is given. Farther to obtain a straight style of shoulder, make the normal ordinate A B of the back part to increase as much as B D = $d\frac{1}{2}$; decrease the normal ordinate E F of the forepart as much as E G = $d\frac{1}{2}$; and likewise decrease the normal ordinate I K as much as the difference I L = *d* 1; lastly the varied acromia of the back and forepart placed together as usual, give the required shoulder.

The altitude of the vertex by this variation is not altered, which becomes evident if R Q is prolonged; and upon this prolongation Q S a perpendicular P S falls from the point P, after which through P a line P O is drawn parallel with S R; then P O passes through the three vertices of the shoulder. Consequently the altitudes of the vertex remain unaltered, which also the position of the shoulder points T and V shows to be the case, because they lie in one line T V which is parallel with P O. The axillar lines have also remained unaltered, as first conditioned; but the collumial lines have not remained equal to each other, their equality under these circumstances not being possible, though it would be well if they could be made equal. To come nearly exact, a little may be deducted at F in the one case, and as much added in the other. Whoever believes that he can by altering the point T or in the other case, by altering V, obtain the equality of the length of the collumial lines, is in error, because this alteration would immediately displace the altitude of the vertex, which would be contrary to the condition, and hence cause the shoulder to become incorrect in its form to the human figure, which must not be, because fit and taste are the first consideration in every construction.

Fig. 5 presents the measure by which the model on pl. 15 is constructed, and requires no further explanation.

¶ 42.——See figs. 1 and 2, pl. 16, which represent a normal model so varied that in the lower scapula region, and also in the iliac region from A to B, it goes closer to the figure than when in the normal form; lay the shoulder back as seen by C D E F G, under the parallel altitudes of the vertices as much as the difference $d\frac{1}{4}$, or $d\frac{1}{2}$, or $d\frac{3}{4}$, which is done when the normal I L and K G increase as much as such differences. But the normal pectoral point M must in the same time take its place in D, so that the difference M D = K O = I Q; draw in the same time G H, or otherwise the model would become too large in the breast (thorax) in front. That this variation is correct must become evident on considering that through it the model is laid more back in the upper and front part of the thorax in relation to the lower part, than the normal ratio of both parts in position to one another required; which is the same in effect as if the piece D M S R were taken out, or such in A B were taken away.

We have to proceed in a similar manner, but in an opposite direction, to cause A B to go to the figure less close than a normal ratio requires; whereby must be again the differences M N = K P = I T, and the model becomes in the lower thoracial part as much as the quantity or piece M N U S larger, which produces an effect similar to A B S M gaining in breadth at A B as much as the piece larger than the normal ratio of the position of the parts to each other demands. We draw also in this case V H, or otherwise the model would become too small in the breast.

That the altitudes of the vertex of the varied shoulder have remained unaltered, the parallel position of the points F, X; E, W show, as well as the vertices under the parallels Y Z, and Y′ Z′.

¶ 43.——We have now so far all cases of variations of models gone through, that the student may proceed without farther assistance. But it may be permitted that we still mention a well known proceeding which all practicians are accustomed to follow, who only guess at the variations. They make no difference in the process, whether the original model is constructed according to one or the other system, or to no system at all. It is especially worthy to be observed,—we repeat—that all masters have the same method, whether they are conversant with each other or not, and whatever country they may belong to. Hence such a fact is worthy of investigation.

The figures 3 and 4 on pl. 16 represent the model, in which the back part always remains unaltered, but of which the forepart according to the proceeding just alluded to is varied by guess, without a clear cause for so doing, or perhaps without any cause whatever. Here is A B C D E F G H, the forepart and side part of the model. First the point A is taken away, and the point I taken instead; at the same time the point I is placed forward, and becomes the new vertex V, instead of the original vertex, and K L is drawn. Farther B is altered into M, C into N, D into Q, and then M N O Q is drawn; F is altered into R, and G into S, and the lines Q E and E R as well as L S are drawn. The variation or better said this blind alteration is accomplished, without first having any clear condition or reason given for it. But what is now the difference between the varied model and the original? this should be known that it may be comprehended to which of the forms of the human figure the altered model agrees.

Now draw out fully the straight T U, parallel with W O, through the vertex of the original model, as seen in the straight T U, and compare the altitudes of both vertices, then the vertex V of the varied forepart lies lower than that of the normal forepart. But as now the point Q lies as much lower, and also O N in O, as the new vertex deviates in a downward position from the original vertex: so have still the two altitudes of the original and the varied forepart remained unaltered. As now the quantity Q E equals D E in length, because Q E is more convex than D E: so the hind part if placed on Q E will not through such variation, lie lower in relation to the forepart, than it was in its normal position on D E. Hence then the back part T W has become just as much longer in relation to the forepart, as the difference between the two foreparts in their vertices, in respect to their heights. As this altitudinal difference is commonly not more than $d\,\frac{1}{4}$, it is clear that instead of such a troublesome variation on the forepart, it is only needful to make the dorsal length X Y as much as $d\,\frac{1}{4}$ larger than its normal quantity.

Second.—As now Q D = C N = A I = H K = G S = F G lie equally forward: so lies E, through such variation, just as much as one of these differences, Q D or C N convexly outward. It is therefore the same, and more easy to leave the forepart in other respects normal, and draw only the convex D Z F, so that Z E = D Q. At the same time we may alter the normal shoulder, as shown at *a*, *b*, *c*, and this forepart comes exactly equal to the varied one.

The varied model in both of these cases has that difference from the normal model that it is longer and wider in the back. But that the diagonal of these models has through this variation become less than it was in its normal quantity, does not agree with the instruction, paragraph 30 and 31, on the abnormal increase in the back. We now question whether such variation is of practical utility? we leave this to be answered by the learned artist, and only say so much: when those who practice by guess can prove nothing, they screen themselves by referring to their own individual experience. But we have, from personal observation known these same persons often with great loss, obliged to make their model once varied, undergo a second variation. To some of them, whom as we believed must have done with their altering, it comes still in their head that the side part now in Q E R is too roundly convex, and then they take away immediately this convexity, by which the side line becomes equal to the original one; indeed their varied model is now completely equal to their original. Why then make the variation, or as they express it, alteration, at all?

As now this kind of variation comes to nothing, how is it that such a method of proceeding is common to so many practical men, by which the commencer only becomes confused, so as scarcely or never to arrive at a clear knowledge of his art? we answer: all practical men feel the necessity of varying their model, according to the position of the figure, and according to the style of the drapery. These two elements becoming mixed together confuse them, when they are uninformed upon the fundamental science of their art; and thus variations are made with a guess, and according to habit. The artist must understand the convex human figure in all its kinds of form, externally, and in regard to dimension and position; know the styles of costume, and bear the whole in his mind, if his hand shall correctly create; he must not alone rely upon his eye, but also upon his mind and understanding.

D, MIXED VARIATION.

¶ 44.——When we have to vary in the same time according to different kinds of elements; namely, style in the costume, and also position in the human figure, there arises a mixed variation; in a similar manner as we vary according to one kind of elements, namely, according to those of different positions of the human figure, the complex variation arises. But these compound variations are all very easy, if the variations of the simple elements are well understood.

See figures 2 and 3, pl. 17. This model represents a mixed variation. The condition of it is neck thick and inclined backward, shoulder (acromion) forward; and according to the costume, as that of a servant, another condition is being much larger in the axillar line than the corresponding normal line. The variation to this condition is made by decreasing the minor dorsal length A F = $1\frac{1}{2}$ as much as the difference A B = $d\,\frac{1}{2}$; the major dorsal length F H = 7 increases as much as the difference $d\,\frac{1}{2}$, and the scapula spine line also increases as much as the difference $d\,\frac{1}{2}$, so that F G = $7\frac{3}{4} + d\,\frac{1}{2}$ becomes larger.

The style form of the back part may be altered or not according to pleasure. The forepart regulates itself through the usual placing of the parts to one another, and the required form is obtained. The sleeve part fig. 5 of the model remains to be noticed. In this take the quantity $A\,C = 10\frac{1}{2}$ or $10\frac{3}{4}$ large instead of the normal quantity, which is 10 or $10\frac{1}{4}$.

Of the measure fig. 1, nothing further is to be observed than that the model on this plate is constructed by it.

Figures 4 and 6 explain themselves, because it is assumed that the construction is understood from the foregoing, by every one who will enter into the study of variation.

¶ 45.——There is still another class of variations, which will perhaps be here the best place to mention, the only condition of which is to be easy, meaning easy in a greater degree than what is otherwise called comfortable; but not so easy that it should not go close to the figure, and to lose the taste on account of being deficient in harmony to it.

To know and correctly to make this variation is very useful; for instance, as when the materials out of which the drapery is made, are very thick, or if it is lined throughout with thick material, which is often the case, as with hunting clothes. A particular model is not given to represent this because the variation is chiefly made in the back part, and the explanation on fig. 2, pl. 17 may serve equally well. Also:

To vary to the condition of being easy, first the normal $F\,H = 7 + d\,\frac{1}{4}$ is made instead of 7; then the normal $A\,C = 3 + d\,\frac{1}{4}$ instead of 3; lastly make the scapula line $F\,G = 7\,\frac{3}{4} + d\,\frac{1}{4}$ instead of the normal quantity which otherwise is only $7\frac{3}{4}$. The remainder is as usual. The differences $d\,\frac{1}{4}$, $d\,\frac{1}{4}$, and $d\,\frac{1}{4}$, may be taken as $d\,\frac{1}{2}$, $d\,\frac{1}{2}$, and $d\,\frac{1}{2}$, or even $d\,\frac{3}{4}$, $d\,\frac{3}{4}$, and $d\,\frac{3}{4}$, according as the physical circumstances require it, as for instance in the case of using very thick or stiff materials.

It is now evident that in this difference there may be as well a negative increase as there can be a positive increase, that is in cases where the model shall be more or less tight than the normal, instead of being easy. The equation would then so appear; $F\,H = 7 - d\,\frac{1}{4}$; $A\,C = 3 - d\,\frac{1}{4}$; and $F\,G = 7\frac{3}{4} - d\,\frac{1}{4}$.

Whoever should conclude that it is only necessary to take a larger proportion measure to construct the model, instead of varying with the differences, and believe that the result would be the same, is greatly in error; for the increase is not intended in all the parts, but only in those which secure a higher degree of ease, and this statement is true of the reverse.

¶ 46.——Fig. 1, pl. 18, presents two models of Dress, one in the English, and the other in the French style of the present time, but both deviating from the normal form of style, which is expressed through the pointed curved line. The variations of the co-ordinates of the models are made, in this instance, on account of the style, but in such a manner of proceeding as is customary to practicians not scientifically informed. They vary the co-ordinates of the model, without knowing that they do so, in making an alteration of the style; while the scientific method of varying the style, is to increase or decrease the co-ordinates, and the artist knows exactly what he is about, as in this manner he can account for his proceeding.

First we will take into consideration the French style. The breadth of the hind part A is larger than that of the breadth of the human figure G; for this reason the forepart in the pectoral region C, must lose what was added in the hind part, so that the size in the axillar curve D C B A may not be less than its normal size E L F G. Through this alteration of style, the back part ordinate wins what the forepart ordinate loses, which two fix the breadths of these parts. Such alteration has influence upon the rest of the ordinates and abscisses of the model; and therefore the indentation H J becomes $H J + J K$, where $J K = L C$. Also the absciss of the hind part (major dorsal length M N) has become larger, because the axillar curve from F to B is placed deeper than the normal curve L F, and likewise the sternal length P Q has increased from the same cause. This usually satisfies the ordinary practician, but not the scientifically informed artist; he thinks farther and soon sees, with the eye of a geometrician, that, through such alteration the vertex O of the model so much recedes from the vertex of the neck of the human figure, as the point F has advanced into C; and besides this, that through the alteration the entire upper thoracial length has become somewhat too long, while the lower is in the same degree too short, which result is not corresponding with the given condition, which is only a wide style in the shoulder; hence through these alterations the model proves a little incorrect. Lastly, he would see that the model may be corrected by making the dorsal length R M as much as one quarter less, and the scapula spine line M I as much as one quarter larger than the normal size gives, and in the same time also the lumbar length N T must increase one quarter equal T V.

¶ 47.——The variation of these styles in scientific order is easy, more certain, and at once correct. It is as follows: the I S R is the normal form in the back. To obtain the French style, put $R M = 1\frac{1}{2} - \frac{1}{4}$; $M I = 7\frac{3}{4} + \frac{1}{4}$; let T S decrease $\frac{1}{4}$; farther $M N = 7 + \frac{1}{4}$, but, if wadding is put in the shoulder of the forepart leave the normal $M N = 7$ unvaried; $H J = 2\frac{1}{4} + \frac{1}{4}$, in the short waisted style; and in the long waisted style vary $H J = 1\frac{3}{4} + \frac{1}{4}$, and W X into W Y; the form of the forepart will be correct without altering the normal L F into C B, however broad the hindpart in G may be, if not excessive. But it must be observed that in this style of shoulder the model always requires $\frac{1}{4}$ or $\frac{1}{2}$ more length behind in the waist, than in other styles; hence the varying of the normal forepart Z X into Z Y, and the length of the back T into V; otherwise the model, being now easy in the shoulder region, would have the appearance of falling from the Figure.

What is here given for obtaining the French style serves also as a rule to obtain the English style, by only treating all the co-ordinates in question reversely; for instance $R M = 1\frac{1}{2} + \frac{1}{4}$, and $T S = \frac{3}{4} + \frac{1}{4}$; $M I = 7\frac{3}{4} - \frac{1}{4}$; $M N = 7 - \frac{1}{4}$; and H J decrease $\frac{1}{4}$, and Z X vary into Z U.

The styles created in this manner belong to the ideal; as in the French style it is thought that a greater breadth and fulness than is really found in the natural form of the region of the back and shoulders add to the beauty of the figure; and in the opposite of this, in the English style, it is thought more beautiful if the region of the back and shoulders looks more confined and small than it is in nature. We find both styles not unfrequently in degree carried to excess. The French style appears often in superfluous quantity; while the English, on the other hand, still oftener appears too constrained, and scrupulously contracted. It is, therefore, better to avoid either extreme, to keep between the two, and endeavour in unassuming modesty to reach the ideally beautiful; in which, we must never forget, that, in this idea, physical nature strives to realize itself, and in which realisation we meet dignified and refined natural forms, which we may know in mathematical ratio, and adopt as guides.

If we well observe the three normal or primary forms of the human figure,—proportionate, slender, and broad, it will be evident that the French style is becoming to the slender figure, because in this figure there is a natural deficiency in breadth. In the case of the proportionate figure it may be admitted, but in the broad figure the French style is absolutely intolerable, because nature has here already given too much breadth. The present English style is the most suitable for this form of figure, but care must be taken not to deviate too far from the primitive or normal form, but rather to lean to that style approaching the ratio in the proportionate form, where the normal ideally beautiful only is to be found.

The model of the sleeve, fig. 2, undergoes an alteration in both styles. When, for instance, A B is the usual depth of the model, C D E belongs to the French style, because F E must be deeper than the normal depth F, otherwise the extension in the region of the shoulder would be drawn by the sleeve, and so brought out of its proper place. The English style requires the reverse, viz. H J G. The models of the skirt and lappel, fig 3, are clear without farther explanation, only it needs to be mentioned that they are of the French style.

It may be useful to observe here, that, when it happens that a drapist has a number of customers who are abnormally long in the dorsal length, he easily falls into the belief that all men have a greater dorsal length than the ratio of the normal form gives. On the other hand, another drapist has customers the greater number of whom are abnormally short in the dorsal length, and he as naturally receives an opposite impression, that the dorsal length is always shorter than denoted by the ratio in the normal figure. Each one adheres to his own, and as he believes, to a more general and better rule, while in reality they are both mistaken, as the rule, neither of the one nor the other is general, but special, each belonging only to a particular class of figures, viz., one to those who are long in the dorsal region, and the other to those who are short; hence the normal form remains the most generally undisturbed in its ratio. We must therefore, place the two cases, long as well as short in the dorsal region, under A, paragraphs 31, 32, &c, and remind the artist that the mastership of modelling is in being able to construct with facility, according to every occurring condition, and not in that, to construct only one kind of model for all conditions and forms.

¶ 48.——The model of the two parts, fig. 4 and fig. 5, represents a complex form,—namely, to the condition that the human figure is long or high in the axilla, and in the same time low in the shoulder (acromion). This form is treated in its simple elements in paragraphs 34 and 38, and merely to present the model will be sufficient. But it may be repeated, that the increase A B of the forepart must be equal to the increase A B of the back part; and farther that M N of the forepart is varied into the position M O, so that $N\,O = \frac{1}{2}$; that K varies into D, C into H, and, lastly, that a human figure of this form always projects in E G, recedes in I, and projects in P.

¶ 49.——The model, fig. 1, and fig. 2, pl. 19, is an example of the style worn before the French Revolution of 1789. It was one not only prevailing in France, but also in England and Germany; at present it is only worn at fancy balls and courts. It is worthy of remark, that these three nations, until that time, were thus much identified with each other in the taste of their dress; certainly a consequence of intercourse and communication during a long peace.

The minor dorsal length A B, is in this style equal to $1\frac{1}{2} - \frac{1}{4}$; $C\,D = \frac{3}{4} - \frac{1}{4}$; and $B\,E + E\,F = 7\frac{3}{4} + \frac{1}{4}$; through which the neck was left more free, and the shoulder more easy than was the case in latter styles of dress. But this style is aesthetically ideal, and was the modern European classical drapery; it appeared in the greatest perfection in the seventeenth century, and perhaps was an imitation from the dress of the southern and eastern nations, to which it has a similarity.

¶ 50.——In the model under fig. 3 and fig 4, on the same plate 19, two styles of dress are presented, English and German, of the year 1820, which but slightly differ from each other. The English style $A'\,B'$ and C D is broader in the shoulder (axilla) than the German $A'\,E$ and $C'\,F$. When the shoulder was worn very narrow, then the normal line, A B of the back part is so placed as the line C D shows; but the increase A C, must always be equal to the decrease B D, which is, in this case, equal to $\frac{3}{4}$. The normal quantity $A\,G = \frac{3}{4}$, and the normal quantity $F\,B = 7\frac{3}{4}$, as usual.

The form being entirely altered round the region of the shoulder, it appeared now, there being no section between the skirt and the body, that it was unsuited to this confined form of shoulder; from this cause arose the section between the body and the skirt, as G H J, and K L J show, and an entirely new form of dress sprung out of the old one. But this change was not easily correctly effected, and those who are conversant with the literature of the art of modelling for drapery in this period, know how very long a time elapsed before this part of the model was made correct. Herein is nothing to surprise, because the lower portion of the thorax is similar to an inverted conical frustum, and, therefore, its surface in the section M J alluded to, demands a curved line G H J, which only a geometrician could at once make correct; and the science of geometry the artists of that time believed to be unnecessary, and, consequently, this part as well as others were guessed at, by many who professed to be masters. The style presented in this model is, in its origin, a copy of a cuirass after the time of the French revolution, and became only later a composition or design according to the aesthetical normal idea of a human figure.

The taste of the present time calls again for an approach to the style presented in fig. 1 and fig. 2; but there can be no difficulty in changing one style into another, as the student is by this time acquainted with the laws which regulate the variations, especially if he compares the variation of fig. 1, with that of fig. 3.

These hints may be sufficient for every reasonable thinker, to be assured how necessary it is to know and esteem the literature of his art at every era, and to know and value at least so much scientific knowledge as is immediately connected with his art, so that every periodical change of form will not oblige him to discover all its first elements over again, or cause him to spoil materials.

¶ 51.——The figs. 1 and 2 on pl. 20 represent a model in the style of a shooting jacket, or of easy apparel in general. This style, so far as it deviates from the style in dress and frock, is only one of convenience, for the purpose of it is to secure chiefly a higher degree of ease, without a departure from taste and fit. Therefore the normal quantities of the co-ordinates require only to be increased, as is seen in fig. 1, *viz.*, 3 into $3 + d\frac{1}{2}$; $7\frac{3}{4}$ into $7\frac{3}{4} + d\frac{1}{2}$; and 7 into $7 + d\frac{1}{2}$. Take away all the differences, $d\frac{1}{2}$, $d\frac{1}{2}$, and $d\frac{1}{2}$, and we have again the normal quantities. The rest of the variation in the style of this model is in that part which can be effected without the help of the differences, and therefore needs only to be imitated and drawn by free hand.

Of the sleeve part of the model, fig. 3, nothing more is to be observed than that the quantity from the middle of the back to A is here equal to $10\frac{1}{2}$ or $10\frac{3}{4}$, instead of $10\frac{1}{4}$.

¶ 52.——Fig. 4 on the same pl. 20, presents a model for a boy's jacket. Although this model has some character of its own in style, still such is more in consequence of formation in the figure of the boy, than conditioned through the idea of style in dress. The conditions of the figure form are, head backward, and shoulder forward. For these reasons, the minor dorsal length, in the model $AB = 1\frac{1}{2} - d\frac{1}{2}$, and $AC = 7\frac{3}{4} + d\frac{1}{2}$, or even $AC = 7\frac{3}{4} + d\frac{3}{4}$. The quantity $DE = 1\frac{1}{4}$ is because childrens' forms are most generally large in the neck; but, in the exceptions to this rule, may $DE = 1$, or $DE = \frac{3}{4}$, which last is the normal quantity.

¶ 53.——In fig. 1, pl. 21, we have a style of an uniform which has a great similarity to a boy's jacket. First, its construction is conditioned to the peculiar style of the uniform, as the model sufficiently exemplifies; and second, its construction is conditioned according to the form of the figure. The military form of the figure is in general head back, shoulders forward, chest out, and abdomen in; accordingly the minor dorsal length becomes $AB = 1\frac{1}{2} - d\frac{1}{2}$; the scapula spine line $AC = 7\frac{3}{4} + d\frac{1}{2}$; and the major dorsal length $AD = 7 - d\frac{1}{4}$.

The construction of the skirt part, fig. 4, requires no explanation, nor that of the collar part, fig. 3, with the exception that A B must be put on in the neck, neither the lappel part, fig. 2, nor that of the bent arm model, fig. 6; but it must be here particularly observed that $AB = 10\frac{1}{4}$, whatever breadth the hind part C B may have.

The model part for the straight sleeve has also no difficulty ; because the part C E G H K J is first in the same way constructed as a model of a bent sleeve, except that G H is parallel to Q P ; then the two parts, G L M H, and N J K O, must be made equal to the part J G H K. The triangle, D B C, must be made to cover C B A ; E F equal to E A, and the parts B N and E L must be made equal to the part B E G J, and cover it. The measures accompanying the models are those by which they are constructed, and taken on a scale to produce a size of models best suited to the book.

In a general survey of all these varied models, it will become quite evident that the groundwork of them remains free and unfettered, in all cases, conveying fixed laws in systematic order, whatever may be the form of the style, or the form of the figure according to which the models are constructed. We must, therefore, regard the groundwork of the models as something general and continuative, and in the same time tangible, consequently such a groundwork is a complete system and of general application to construct models for draping the human figure.

CONSTRUCTION—CONTINUED.

MODELS FOR VEST.

¶ 54.——The same breast measures are used in the construction of models for vests, as those used in the construction of models for Dress and Frock; and as these measures are described in the foregoing paragraphs, the mere representation of them accompanying the models on Plates 22 and 23 will therefore suffice. But the length of the vest mentioned in paragraph 3 Mensuration must be observed in fixing the length of the model to it in front L, from G downward, having first the breadth of the back O B deducted from the length. It must also be mentioned that there is no ground length used in the construction of the vest models, whereas it was required in those of dress and frock; and farther, that the proportion numbers used in the vest models are abbreviated deductions from those numbers which were used in the dress and frock models; while the construction is made as simple as possible without giving up the correctness of the process. The measure fig. 1 shows that the form of the figure measured is normal in the size of the waist in relation to its breast measure, and the model fig. 2, pl. 22 is constructed according to this condition.

The co-ordinates in the models stand under right angles to one another; and the proportion numbers are all given with them; hence this neither needs any further explanation. But in case the figure is thick in the neck, A B on the hind part of the model may be made equal to $\frac{1}{2}$ instead of $\frac{1}{4}$. It is seen on the same figure that E C = 9, but must be so much increased as that C D = 1, reckoning for the lessening caused by putting the parts together.

Out of the centre F with the distance F G draw a circle G H which gives the collumial line for the model, but if the vest for which the model is constructed is to be buttoned close to the neck, draw a line G I as high as I H = $\frac{1}{2}$. The size of the waist K L and M N is equal to R where as in this case R = 15 units.

¶ 55.——The real size of the waist (R) shows a positive difference (D^+); namely D^+ = A B on the measure fig. 3, and according to this D^+ and measure the model fig. 4, pl. 22 is constructed. But the condition is, besides that the figure is abdominal it is also broad in the circumference of the chest (breast measure) to its height, and hence the model must be varied accordingly.

The model is first constructed after the same proportion numbers as those in the preceding paragraph 54, which the pointed line in fig. 4 shows, and when this is done the variations are made according to the condition of the figure form. First the increase of the size of the waist in the model is made after D^+, as $\frac{1}{2}$ D^+ is added in the front on the forepart, and the other $\frac{1}{2}$ D^+ is added in the side of the hind part. Second, the variation is according to the broad form, but as we have not ground length here we vary A B C into C D A, so that D K = $\frac{1}{2}$; proceed similarly with the hind part, varying D E F into D G F; and lastly vary F H C in F I C, so that H I = $\frac{1}{2}$ = K D.

¶ 56.——Fig. 5, pl. 22 shows the construction of the collar part as follows: from the point A with A B draw a curve B C, make B C = 3; draw a straight line E C D through the fixed point C, and through the point D taken at liberty, according as the turn of the vest is to be high or low, and form the collar part as shown on the model. Similar to this the collar part on fig. 4 is also formed; farther explanation is therefore superfluous.

The model fig. 6 differs from the preceding one in the style of costume, just so the collar part fig. 7, which is a standing one; although it may also be turned. For want of space the collar part is not given in its full length, nor is it really necessary, as A B is always drawn parallel to C D; afterwards C E is drawn, so that the piece C D E is taken off from the entire A B D C.

¶ 57.——The model fig. 2, pl. 23 is constructed according to the measure fig. 1 which presents a negative difference (D^-) namely $D^- = AB$. From the front of the fore part in the size of the waist $\frac{1}{4} D^-$ is taken off, and in the side from the back part $\frac{3}{4} D^-$ is taken off; but A B must always be $= \frac{1}{2}$ D C, however great C D may be.

The remainder of the models on pl. 23 show merely differences of style in costume. Still the second form of the forepart in fig. 2 may not be unworthy of some attention. This form E F G H I is varied from the normal form E K L I, in case the human figure should be very projecting in the region of the mamilla M. In this variation the following is to be observed: first cut the piece O M N out of the model, draw E L, make $EP = NO$, $LG = NO$, draw E G and place the triangle E L K in the position of P G F. Draw the curve G H concentrical to the curve L Q, draw H I, and the variation is completed.

Through this means we obtain that a greater size is brought in the surface of the model over the chest. But if the object is only to shorten the line H I then the proceeding in fig. 3 is preferable, as it is seen in the form A B C D, deviating from the normal form A *o o* D; and the reverse effect is produced by the form D E F A, which deviates in the opposite direction from the normal form.

Fig. 4 represents a model for a court or fancy vest; and fig. 5 a model of a modern French style, in which there is nothing more to observe than that we are convinced every student who has attended to the given rules in the construction of vests, may be able to construct any kind of model, not only to the figure, but equally to every style of costume.

MODELS FOR TUNICS.

¶ 58.——In the construction of models for children's apparel the ground length is to be made use of besides the breast measure, and in the same manner as that taught in the articles on Models for Dress and Frock. The form of children's figure is mostly $h < b$, see paragraph 18, sometimes $h = b$, but rarely $h > b$. The construction of the models on pl. 24 and pl. 25 is according to the form of figure when $h = b$, and D^+_1, and it need only be mentioned, if $h < b$ the lengths in the model are taken from h, and the breadths from b; and farther as the models given are all constructed after the form $h = b$, and in this case the quantities h and b need not be distinguished from one another, so, we have only their co-efficients (commonly termed proportion numbers) marked on the co-ordinates of the models.

The measure represented in fig. 1, pl. 24, is that by which the models are constructed, and which is known through the article on mensuration, and as the units from the ground length are not given with this measure it must be understood that $h = b$, and that the breast measure and its units 1, 2, 4, 6, 12, 18, are sufficient by which to construct. This measure shows also the real size of the waist (R) and the difference D^+ between the normal and the real size of waist.

The model fig. 2 is a general Tunic model, in which $AB = 9$, $BD = 1$, and $AC = 9\frac{1}{2}$; $BE = 8\frac{1}{2}$, $CF = 8\frac{1}{2}$, and $FG = \frac{1}{2}$; $FH = 3$, $HI = 12\frac{1}{2}$, and $IE = 3$; draw the circular line I K out of the centre E with the radius E I, and lastly draw the curve H G with a free hand. If we would compare B E with G C, then it will be seen that G C is less than E B, when these two quantities are, in the case of Models for Dress and Frock, equal. This is accounted for by the peculiarity of the form of children's figure, which is shoulder forward and upward, and head backward; hence a Tunic model requires, what in common language is termed, a long shoulder, so as to cover the axilla region, more especially as it is necessary in the case of children to cover it easy.

The lower part of the model corresponding to the lower part of the thorax in the figure of a child is still more simple in its construction. Here is C L = 8, M N = 2½, O P = ¼, taken largely, so that the quantity A C in O P becomes ¼ less; the lines Q O M, and Q P N may be drawn out by free hand. The line N R must be drawn onwards from the point of inflexion N, straight, and parallel to C L; the breadth L M is taken at liberty, and the indentation M N is taken equal to 2½ in children's forms. The whole of the increase is added to the front as S T in fig. 2 shows. Q R is made equal to Q M, and from the point R a perpendicular line R S is drawn upon B S, so that B S R becomes a right angle, and lastly make S U = 1½.

With the radius of 2½ = A V a circle A W Y Q is drawn out of the centre V, which may serve as a normal line nearly corresponding to the real axillar line in the human figure, and through which is here seen the difference of the axillar line Z A′ Q B′ in the model. Farther Z Y = 1½; Z I as well as H Y is drawn, making H B′ = Z I.

¶ 59.——The sleeve part of the foregoing model is constructed of a close form, similar to that of the boy's jacket model, or to that one belonging to the dress and frock models; or it is of a loose form as indicated in fig. 3 on pl. 24. The under part A B C D is in the first place constructed exactly as the close sleeve part; namely A E = 3¼, A B equal to a half of the axillar line Z A′ Q B′ of fig. 2, then make F C = 1½, and C D = 6½, &c. &c. When the under sleeve part is completed draw from the centre D with the distance D A the curve A G, and out of the centre C with the distance C B draw a curve B H; A G take at liberty according as the sleeve part shall be more or less loose, and then make H B = A G. After this H G is halved in I, I K made equal to ½ I G, and out of the centre K with the distance K G a circle G L H is drawn. Lastly G M is drawn straight, and H N is produced by free hand as the curve presents.

The sleeve part of the model just now treated of, is of a bent form, although loose, but fig. 5 represents one of a straight form. The bend is of course at the elbow. In the straight form also, the line A B = 3¼; the C B is under a right angle C B A drawn upon A B in B; and also A C = ½ the axillar line of the forepart, D E = 2¾, and the curve A E C drawn by a free hand. Just so make D K = ½, and draw A K C by free hand. The pointed line E L is drawn exactly in the middle of C H and A I. The outside G F C must be held on in F, and the inside C F H must, on the same place F, be stretched out in putting the two edges together. The point C must meet the middle of the forepart under the arm.

The sleeve part of the model fig. 1, on pl. 25, is the same as that which has just been explained, with the exception that this one is given open, whereas that on pl. 24 is shown as folded in A I, (see fig. 5). The construction of the sleeve-part fig. 1, pl. 25, is besides, quite clear without especial explanation, requiring only to be mentioned that, after the co-ordinates C G, A E, and their co-efficients are put on them the remainder of the co-ordinates are also fixed, and the curves A B C D E, and F G H are drawn by free hand.

¶ 60.——The skirt part fig. 4, pl. 24 is given of the true Tunic skirt form. B F is reckoned for lapping over; B C is made equal to whatever length is chosen, but it should never be longer than to reach to the knee; it may rather be taken shorter, because if it extends lower than the knee it destroys one of the chief geometrical parts of the human figure, and with this, destroys the effect of beauty also; especially as regards a Tunic which should convey the idea of elegant attire and not only of a mere covering for warmth.

Farther it is seen that A B = ½ R (see R fig. 1 on this plate) afterwards out of the centre A with the distance (radius) A B a circular curve B D E is drawn; in A upon A B a perpendicular line A D is erected, and D E made equal to the quantity which the breadth and plaits of the back part require, say D E to be equal to about 3 inches. By the breadth of the back is meant the part L M in fig. 2. Lastly the circle G H C is drawn, and in putting the parts of the model together, the curve B D is to be stretched out so that the foldings fall gracefully in the part H C.

¶ 61.——The models presented under figs. 2 and 3 in pl. 25 have the same groundwork (co-ordinates) as those described in paragraph 58, with the exception that in fig. 2, A B = 2 instead of 2½; and that D lies above the line E F instead of in it, and E lies in E F instead of below it. The remainder differs with the style of the fashion, and is taken quite at liberty. This model is very becoming as a child's jacket, worn over other dress, and is sometimes termed an over tunic; it is also very useful as a model of an under flannel jacket for grown persons.

Fig. 3 on pl. 25 is a Tunic Jacket model which does not require farther explanation, as it differs from the Tunic only in the skirt part. The skirt of this Tunic Jacket is an ancient German jacket skirt, which is still worn in many parts of Germany by the peasantry; it is pretty and graceful, and if the whole apparel is otherwise appropriately arranged to correspond, it looks even picturesque and beautiful.

The model fig. 4 pl. 25 presents a child's loose paletôt, of which the part A B C D E F G presents the back, and H I K C L M N O the forepart. The construction of it is self-evident, as the co-efficients are all given with the co-ordinates, only leaving it to be mentioned that A K = 3¼, and the circle P K B is drawn out of the centre A with the radius 3¼, also that Q R = 8.

The measure fig. 5 under these models, is as usual the one by which they are constructed.

With this we have given the principal groundwork, and the necessary information for constructing models for children's apparel; every artist who is well acquainted with them will be able to construct any other kind of model which the time or the figure may require.

MODELS FOR TROUSERS.

¶ 62.——The method of taking the measure from the real figure for the construction of trousers' models is treated of in paragraph 4, Mensuration; and mention is made in paragraph 5 of the proportion measures, which are also brought into use in the construction of these models. The proportion measures referred to in paragraph 5, are, in size, equal to the breast measure of the figure; and as we found in Anthropometry that the gluteal circumference is equal, or nearly equal to the thoracial circumference, we may safely take the proportion measure of a size equal to that of the gluteal measure and construct the model by it. As an instance we may grant the gluteal measure to be equal to 18 inches, in which case take the proportion measure of 18 inches as the size by which to construct the model, that is, so far as it is required; for only a few proportion numbers are needed, the greater portion of the model being determined by other direct and given measures. Fig. 3, pl. 26, presents a proportion measure, understood from the instruction in paragraph 4. The measure B C only, is here made use of. The real size of the waist R farther indicates that in this case R is equal to the normal size of waist B *o*, namely R = N.

A farther examination into Anthropometry shews that the thigh measure in the femorial circumference is not in that constant ratio to the breast measure which the gluteal measure bears to it; still the difference, which is fluctuating, is never so great that it need be regarded in the construction of models. For this reason the stride may safely be determined by either the one or the other. The thigh measure is to be obtained by placing the measuring tape on the figure in the region of the femorial section (see my *Anatomy*, pl. 7) and laying it close on the undress side. Any other measure which may be useful, as the rotular, tibial, &c. must also be taken close to those parts; as a vague and loose measurement could not give us a true knowledge of the size of the parts which it would be desirable to ascertain.

The half thigh measure A B, fig. 4, pl. 26, is divided into three parts, A C, C D, D B, and each of these parts contains 3½ units, equal, or nearly so, to 3½ units of the proportion measure. If any difference exists it is so small that it can only be detected by comparing equal multiples of units of thigh and proportion measure, as 3 to 3 or 4 to 4, &c.

¶ 63.——Before entering into the simple art of constructing models for trousers, it is desirable to bring those scientific elements to the mind treated of in Anthropometry, namely in the development of pelvis and leg, especially fig. 9, pl. VI. Figures similar to these are represented on pl. 26 of the present work for the farther precise development of forms. First, fig. 1. The legs of this figure will illustrate that if one should be placed slant as N N' or vertical as N M, the depressions ¾, 1, ½ will always be the same in every normally formed leg. Compare in this respect both figures 1 and 2, and it will be seen why the depressions K L = ¾, M N = 1, &c. for which see fig. 2, are so in every case in the construction of models. In Anthropometry we proceeded so far as to find the coccyxial point F, the ilial point Y, and F I = 13 units, see fig 2, pl. 26; but here we have to add F Z = ½ unit, allowing for the curve on the back part at the junction of pelvis and leg. Second, see fig. 1, pl. 26. We have here to define the proportions of the gluteal section, namely the straight line J H = J K E = 10, the straight line F G equal to the curve F E = 8¼ units. Now these straight lines J H and F G shall correspond with the straight lines A' D' and *a* D', fig. 2. But similarly and for the same reason as the sizes in the leg sections of the model are greater than the corresponding ones in the figure leg, which is seen by comparing section to section in the figures 1 and 2, pl. 26, so are those sizes likewise greater in the gluteal section of the model pelvis, than those of the figure pelvis. On making a comparison of the magnitudes in both figures, it will be found that those in the figure model are one unit larger than such in the figure leg; for example, in the ankle the ratio is 4½ : 5½; sural 7¼ : 8¼; tibial 6¼ : 7¼; rotular 7 : 8; femorial 10½ : 11½. In like manner the gluteal lines 10 : 10½; but the pubial lines do not present such uniformity with the rest; as F G : *a* D' = 8¼ : 9½ when it should be, retaining the uniformity, 8¼ : 8¾; thus in fig 2, *a* D' is ¾ too large, which will however be rectified farther on. In the ilial section (compare the corresponding lines in both figures 1 and 2) the

C B : W Y = 7 : 7; and A B : V Y = 8 : 8. In this section the sizes are perfectly equal, and nothing is allowed for seams in the model, as has been in the other parts, and which may be done or omitted according as the trousers are close or easy in the size of waist.

In fig. 1, pl. 27, let there be every thing in the model as before, and in addition be drawn in it a perspective figure pelvis A B C D E F. If it is now considered that the perspective curve E A B C must be stereometrical in space, equal to its corresponding plane section E A B C, fig. 2, and this so in the parts as well as in the whole, then it is clear that A B of fig. 1 is equal to A B of fig. 2, &c. Now if in fig. 1, the part F A G D is moved in the position of A' G' D' on the centre F, so that the distance from the coccyxial point to H is equal to 5 units, then it may be perceived that the A' G' is nearly equal to I H; and likewise that the distance from G' to the coccyxial point is equal to C B A of fig. 2. And as the distance from I to the coccyxial point fig. 1 is rather greater than the distance from G' to that point, so is the first distance fully capable of covering the line C A B of fig. 2; hence cover likewise the perspective curve C B A of fig. 1. Thus is proved in another way the correct position of the gluteal pelvial part (that is the hind part) of the model in relation to the leg part.

With reference to the pubial part in the pelvis (see fig. 2) the pubial D recedes similarly as the gluteal B is projecting. And for this reason the forepart of the model must be constructed in a reverse form to that of the hindpart: see fig. 3, pl. 27. In the first place all shall be as before in the case of fig. 2, pl. 26. After this let the forepart A B C move into the position A B' C'; thus is C' D < C D, and D in relation to C' has receded, when the new curve C'D is drawn harmonious with C D. This is in correspondence with the form or depression of D in fig. 2. But in the form C'D in fig. 3 the magnitude of D A has become no less than it was before, which was already ¾ unit too large. Hence D A must be lessened in the end A, or more suitably in the end D. For this reason, therefore, let us proceed to fig. 4, pl. 27, and move the forepart A B C into the position A B' C', and make D E = ¾, draw C' E, and it then becomes E A = 8¾. This form in E will correspond with the receding form or depressed position of the os pubis in fig. 2; and likewise reach the required magnitude looked for in the gluteal section, fig. 2, pl. 26. Thus we have satisfactorily disposed of the scientific elements in the construction of proper models for trousers, and there now remains only a few more points that will call for attention.

First observe, in figs. 1 and 2, pl. 26, that the model, fig. 2, is somewhat longer here than the fig. 1 to which it belongs. But, as already mentioned in Anthropometry, it is lengthened, because a physical plane, when placed on a convex body, carries up, besides an allowance for required seams or turnings. And as the entire in the model is greater than the entire in the figure, so it is likewise the case with the parts, each to each. Thus it is that the os pubis *a* in the model fig. 2 is lower posited than the same point P in the figure (fig. 1). And so with the rest of the parts; all bear the same proportions in the model that they do in the figure, and invariably have done so in every model and figure. The tibial depression N is situated in the half height of the os pubis *a* and the sole of the foot. Second, if we receive an impression of a form from the side view of fig. 2, pl. 27, in nature, and sketch or draw a shape, this shape would be about such a one as figs. 5 and 6, pl. 26 present. Thus we received from that impression the first idea for drawing a form for trousers, however dark, confused, and imperfect it was as to correctness in the form and size of the real figure. But as soon as a measure is given of a definite size, and a model required scientifically correct, constructed to the measure and form of that specific figure from which it was taken; then the mind is called into action and the matter becomes in its operation a scientific art. Thirdly, see fig. 8, pl. 27. It may be mentioned that if we have a system of elements, such as lines and angles, below and above an axis, X, brought in connection one with another in a point or more, posited in that axis, then whatever the one system undergoes the other will be affected, that is, its co-system; bear in mind the relation of angle *u* and angle *z*. Similarly if three systems are connected, such as are presented in fig. 9 on the same plate, they will, under similar circumstances, influence one the other. This however will be properly studied in Geometry and Mechanics. It is here only alluded to because that these abstract figures correspond with pelvis, thigh, and leg, and therefore may lead to reflection.

I. MODELS FOR A FIGURE NORMAL IN SIZE OF WAIST.

$R = N$, or $R - N = O$.

¶ 64.——The two last paragraphs are to be considered as an introduction to the art of constructing models for trousers. In this paragraph we proceed to the simple construction itself. See fig. 7, pl. 26. In the first place draw a straight line H H' equal to the side length taken from above the iliac to the sole of the foot. Make H' P equal to the leg length. Now bring into consideration whether P H is equal to the pelvial height of the figure, which height derived from Anthropometry is known to be 9 units. Remembering from the preceding paragraph that the parts in the model must be greater than their corresponding ones in the figure, it follows that at least it ought to be $PH = 9\frac{1}{2}$ units. Farther, whatever is allowed above the iliac H, it must be given independently of the pelvial height. For this reason then, if only the side length and no leg length is given, and any quantity above the iliac H is required, the amount must be definitely stated and allowed for. If the side length is given, and the pelvial height known from the proportions, the leg length is known without being given, which is by itself evident. Farther draw perpendicular lines J P, L H, and E H' upon H H' in H, P and H'. Define next E H', J P, L H, and H Q as the proportion numbers indicate. Next draw *a* E and K F. Halve K F in O, and draw the rest of the line by free hand through the point which the proportion numbers have defined. F indicates the centre of the heel. Similarly as with fig. 7 proceed with fig. 8. In the ilial size of these two figures 7 and 8, the seams are allowed as $LH + QH = 9 + 7 = 16$ of the one, and the other $eL + ZM = 16$ likewise. But should the nett size be required in fig. 7, make the forepart L H less in the end at H; and in fig. 8 make the hind part less in M and Z. All models for trousers are constructed in this manner, and we have only concurrently with these general elements to consider the details or specialities. The measures fig. 3, pl. 26, and fig. 5, pl. 27, are normal in size, as $R = Bo = 15$; and as the ilial size or size of waist in the model is 15 units without seams, it is clear that such size agrees with the measure.

Before going farther, it is well to consider in the construction of models, where the numbers define the positions of parts, and where they define size. Then, although the same number, sometimes defining position, and in the same time defining size, the difference must still be kept in mind. Fig. 7, pl. 26, gives an example where $LH = 9$ and $QH = 7$, define position and quantity in the same time; and fig. 8 gives another where $eK = 9$, $ZK = 7$ define position only, when $eL = 7$ and $ZM = 7 + 2$ define size or quantity.

We see on fig. 6, pl. 27, no difference in the general construction from that of the preceding model, beyond a few special points. From the leg-axis lying in a slanting direction, a greater length is produced on the inside of the model, which is as much as A B. There are besides cases where the hind part in the gluteus and stride region are increased much beyond their normal extension, similar to C D A; but all increases which are above the normal quantity must be left in practice to special conditions, and the student must carefully distinguish between quantities, constant and defined, and quantities variable and indefinite.

Fig. 7, pl. 27, is another model, quite opposite to that just described. It is distinguished by great fulness on the hip, and by being flat in the seat; whereas in fig. 6, the hip is formed close, and the seat very full; however, this belongs more properly to style than to form of figure.

II. MODELS FOR FIGURES ABNORMAL IN SIZE OF WAIST.

A. NEGATIVE, NAMELY $R < N, D^-$.

¶ 65.——As this construction may be fully comprehended from the preceding paragraph, and from the proportion numbers indicated on its co-ordinates, it is only necessary here to fix the attention on the proper distribution of the negative difference, D^-, of the measure, fig. 3, pl. 28; namely, that the D^- must be taken from the normal form of the model fig. 2, in the same manner as the D^- in the size of the waist indicates. Compare the figure form, fig. 1, with the model fig. 2, namely, the ilial section B C D of the figure with the waist size of the model, and the distribution will be clear by itself. It may here be repeated that the tibial depression G, fig. 2, as well as fig. 1, is always in the half height between the os pubis F, and the sole of the foot; $\frac{E\,F}{2}$ and $\frac{H\,F}{2}$.

B. POSITIVE, NAMELY $R > N$, D^+.

¶ 66.——For the form of a figure positive in the size of the waist, see fig. 5, pl. 28, of which the normal size is A B C; the positive difference or increase is indicated by the dotted line external to the normal one. Fig. 7 is the measure by which the model fig. 6 of this figure is constructed. In this measure is $A\,o = N$. Now if we take the smaller N from the larger R, that is $R - N = D^+$, then we have the positive difference D^+ or increase of the size of waist beyond its normal size. This increase D^+ of the size of the waist, being chiefly in the front or abdomen of the figure, naturally causes in every figure possessed of such abnormality a leaning backwards. And this causes a greater angle in the junction of pelvis and leg than exists in a normal form. The model, fig. 6, requires a construction accordingly. For this reason then, after A K and Q K are defined, and the lines G K, M Q, and P A are drawn, make $F\,K = 6\frac{3}{4}\,b - \frac{1}{4}\,D^+$. Draw D F, halve it in E and proceed with the rest, first as the normal forms and the proportion numbers indicate. After the normal form is defined, distribute the D^+ of the measure in the size of waist as indicated on the model. Now in the increase P N of the model, fig. 6, and the increase A C with the decrease of F K being $\frac{1}{4}\,D^+$ less than the normal $6\frac{3}{4}\,b$, the entire model, proportioned to the figure in question, has a backward leaning likewise. Thus we have constructed models for the three forms of figure, normal, negative, and positive in size of waist.

To the class of forms just treated of belongs fig. 10, pl. 27. This model is constructed by the measure fig. 11, and as seen has a D^+. But if we compare the two models they will be found different in form although of the same measure. The real figure according to which this model was constructed was not only abnormal in the size of waist, but abnormal in other parts at the same time. By a course of gymnastic exercises it was much depressed at the os pubis A, and projected at the upper part of the gluteus B. Thus in the deviating or twisting from the normal form the stride C became affected likewise, and required to be harmoniously drawn to the projection at B. The rest of this figure must be evident from the foregoing and the proportion numbers; it being only needful to mention that the greater height E in the hind part, than the normal height, and the lowness D of the forepart (low for such a form) is to be accounted for by the circumstance of no braces being worn by the person alluded to. These cases always require considerable height in E and corresponding lowness in D; for under these conditions the garment is tight in the waist, and pressure cannot be borne in the higher part of the abdomen, however much may be on the lower part of it.

ON STYLE OF MODELS.

¶ 67.——If we speak of style in the sense of that which is becoming to the specific kind of form to be dressed or draped, then style means that which is presented when the figure is attired in such a manner that nothing could be either added to or taken away from any part without detracting from the beauty of the figure in its entire. This style, termed the beautiful, presents itself in the special as the complete or perfectly becoming; it is in the abstract, universal, and ought to be manifest in every style, whether accidental, fashionable, or conventional. It is the object in draping a human figure always to insure a style in this sense, combined with fit; but at the expense of fit, if the becoming is made the primary object of consideration. But styles in dress, as form, floating or accidental, are as to number infinite. Still the artist must, by presenting each in the human figure, let the beautiful and the becoming be the most conspicuous features.

We will however enumerate some few cases, in models for trousers, although they are inadequate to convey the infinite number to be discovered by an imaginative or reflective mind. First, it is sometimes affirmed that a better style in trousers may be produced, and with greater precision, if the fore and hind parts are drawn and constructed separately. Although this is an error, and is merely a matter of habit, still having different styles to give it may be as well to know how to construct a model in this way. See as an example fig. 4, pl. 29, constructed by the measure beneath, and it will be observed that the groundwork of the model is the same as that of the preceding ones. If we now reflect that the forepart and the hindpart have the centre E of the femorial section in common, and that likewise F C = 3½, if A C is drawn perpendicular to A B in A, then it is evident that the forepart as well as the hindpart may be drawn independent of one another. For these reasons then see fig. 2, pl. 29, draw two lines A B parallel to G H, distant 7 units of the proportion measure; define side length as well as leg length; make F C = 3½ units, F E = 5¾ units, and find the pubial point D as before and as the proportion numbers indicate.

Note.—It may be worthy of observation that F C equals likewise ⅓ of the half thigh measure, as has been said previously, if such is taken close on the undress side of the figure. And as C L = 7 units, it is likewise ⅔ of the same measure. Now 3½ + 7 = 10½, and this is the half thigh measure (femorial measure) in units. This may be still better illustrated by fig. 7, pl. 30. Here is the straight line A B equal to the half circle, and so likewise is C F, if the circle is drawn with a radius G E = 3⅜. And thus if the entires are equal their respective parts must be equal likewise; namely A G = C D, and D F = G B. Hence if A B is given as the half of the thigh, then ⅓ of it, namely A G may determine D C. Thus the stride may be defined by the unit of the breast measure, or by the ⅓ of the half thigh measure.

It may here be the proper place to mention that in some form of the human figure the thigh is small in relation to the circumference of the pelvis; and others again are the opposite. And as the stride not only affects the size of the leg, but more so the junction of pelvis and leg, especially the length of line in the plane section from the side view of the pelvis, therefore this is evident: that a figure with a *large-sized thigh* and a *small pelvis* in circumference, will be found to have a small stride; and *vice versa*, a figure with a *small-sized thigh* and a *large pelvis* in circumference, must have a large stride. Farther, see again, fig. 2, pl. 29; after the undress side is formed, we see likewise that the half distance from C to the pubial point D is nearly ¾ unit. And for that reason the forepart may even be formed without finding first the pubial point D; but which however it is better to ascertain previously, on account of its giving a clearer insight.

Wherever now we may place the forepart on the hindpart, the model remains unaltered in form and size in all its parts, as seen in figures 1 and 3, pl. 29. And should the conclusion be now arrived at that there would be anything superior or different in the forepart being constructed upon the hindpart, either in the one or in the other position, such would be an error; although it might be so constructed easily from an exact knowledge of the proportions. Still if we would construct the forepart upon the hindpart, undoubtedly the position of the forepart taken in fig. 4 is the best, because the parts of the model have the femorial centre E in common.

Merely on account of variation in style, we see in fig. 3, pl. 29, some deviation in the hindpart from the usual form, namely, as the figure is according to the measure given normal in the size of the waist, and as such equal to 15 units; and as C D = 7, so must be A B = 8; then C D + A B = 15, the required size; and is likewise according to the foregoing, correct in form. But to reduce the model in the seat F, the quantity B E = 1 is taken from A B of the end B, and G A = 1 is again added to A B at the end A, and the line G F is drawn. Thus is G E = A B = 8, and C D + G E = 15 as above, correct in size, but varied in form according to condition.

There are on pl. 29 other figures of style, quite conventional, for morning or private wear. Fig. 5 is such a model, to which belongs the foot piece fig. 6. So is fig. 8, the leg part only, of the same kind, to which belongs the foot piece fig. 7.

¶ 68.——There are still other styles presented on pl. 30. To construct these, is from a knowledge of the system by itself clear. In these models the size of the waist is made equal to 16 units, one unit being reckoned for the seams, instead of the nett size of 15 units. Thus shewing if such addition is required where to give it, namely, on the side of the hindpart.

As to the stride of the models in the forepart on this plate (30) the undress side is lessened as much as the dress side is increased. If however the stride, dress and undress is lessened much beyond its normal size, the stride of the hindpart must be as much increased. This is exemplified in fig. 5, pl. 30. See D F = D E. Besides this the forming of the dress in the forepart depends much on the carriage of the figure; if for instance, projecting in the os pubis, scarcely any dress can be taken from the normal size for the undress side, but the dress side must be increased the more for it. The reverse is to be observed if the os pubis is much receding. In this case the normal size may serve for the dress, and much may be taken from the undress side as seen in fig. 10, pl. 27.

In the manner hitherto treated of in forming the undress side, it is often preferred to let the line A B of the forepart run parallel to the line D F of the hindpart, instead of A C and D C, see fig. 2, pl. 31. Still, which ever way is chosen the extreme stride point E will demand its natural position. But in all this change of form in the stride, a certain relation of the point C to A, and of D to B, fig. 3 must not be overlooked. Therefore we direct the attention to O C = 3½, O 'D = 3½.

¶ 69.—There is a way different from the above to define the dress and undress side in the stride, namely, to cause the dress and undress to run in the leg line, as C presents on figs. 6 and 7, pl. 31. After this condition the points B in both figures must be taken sufficiently low, so that the line $BC = AC$. The formation of dress and undress is independent of the size of the stride which may be different, and for example is in fig. 6 larger than in fig. 7. But attention must be especially given to the harmonious evenness in the stride curves, which the proportion numbers precisely define. If a model for trousers should be required without a leg seam it would be unavoidable to proceed in this way to form the dress and undress side of the stride, which some persons however deem the best in either case, whether there are leg seams or not; hence we have given the same in the models pl. 29.

¶ 70.—There is still another style of models for trousers which is termed the breeches style. See figs. 4 and 5, pl. 31. Fig. 4 is of a more modern construction than fig. 5. There is something peculiar in this style of models; first that the stride is in size larger than in the former ones, and second that the leg line A B, towards A fig. 4, and G fig. 5, is quite straight, instead of being as usual curved in this region. If models are constructed in this style it must be observed that unless they are very close in the side, there will be a fulness on the inside of the leg, in the front as well as hindpart. For that reason if they should be required close on the inside of the thigh, and full on the outside, such a straight line on the inside must not be drawn on the hindpart, although it may be on the forepart; but in this case the former mode must be retained, that is to draw the hindpart curved, which has the effect of lessening the inside of the model. Their construction is to the nett size of waist; so is $GC + DE = 8 + 7 = 15$ in fig. 4; and if seams shall be allowed in the size of waist, the quantity E F must be put at the iliac point E, as the pelvial part and leg part are joined under right angles. But in fig. 5 the allowance for seams in the size of waist may be made in A as A D indicates; or the half quantity for them may be added in A and the other half in B; because in this model the leg part is joined with the pelvial part under an acute angle E F G, as inserted between the two right angles upon which leg and pelvis join. This latter figure is of importance, so far as it brings to the mind the fundamental idea of the correct placing of the pelvial part in relation to the leg part, in the hind and forepart of the model, under certain and various conditions or requirements.

Fig. 1, pl. 31, is a truly original leather drawers or pantaloons model of which the groundwork is the same as the previous. It is drawn without dress or undress, as the abdominal line runs through the pubial point. If without a leg seam, as when made of leather, the leg has the position of A B C D K, and it must be straight in E to fall in the position E G F with the part E B C; if it has a leg seam it may be constructed so at once. The forepart M is always taken fully an inch lower than the dotted ground line. But the hindpart H may be taken as much higher. And if the forepart M I L is formed instead of M K L, as customary in these kinds of models, then it is better to add at most one unit in K, and take off the same quantity again in H, and raise in the same time the point H nearly twice as much. This model is the prior idea to figs. 4 and 5, and even to form the stride of figs. 6 and 7.

There is another model, fig. 8, pl. 31, which has a similarity with fig. 1. But if we observe the parts in the pelvial region the difference soon becomes manifest; so it is with the leg part which has a position in relation to the pelvial part far more slanting, and under the same angle to the pelvial part as that in fig. 5.

This model, fig. 8, is one of a belt drawers. The abdominal line A B C may be drawn, if merely for a plain drawers, but if for a special belt drawers E F A D must be drawn separately, D C makes the stride, and C E is held a little on in D E. The hindpart to this belt is G E F, likewise separately drawn, and if E G of the seat is made larger in size at G, it must be held on in the belt part G E. Although it is not customary to do so, the point A may be taken lower than it is.

Note.—As to the styles of the bottoms of trousers they have been and are made in so many forms that their number is endless, in fact every small change of line produces a different effect, hence arises another style. Fig. 9 is one of the earliest gaiter bottom forms, dating from 1830, and given here for its peculiarly good foot; but all such forms on the foot are hard and stiff, and for that reason in a fine art sense to be avoided, unless a historical character of costume demands such minute precision. In forming these bottoms, it is only necessary to observe the centre point A of the heel, from which to place 3¼ distant on each side, the strap, running under the sole of the foot. There are other and more modern specimens of this class, producing a different style of trousers from that just mentioned, namely, those on pl. 30, and pl. 28, which are also more easy in falling over the foot. But whatever style of model is designed, and to whatever form of figure it is intended, all contraction must be avoided, and an unconstrained, natural fall be insured, and most scrupulously so when they are designed for the studio of the painter or sculptor. Because the artist sends his works forth not only into the world of his own time, with the intention of raising the standard of taste, but he likewise, independently of his own will, does so for future generations by the preservation of them. The true artist must have before him the real object, put in its best form; in order to endow his works more thoroughly with the true and the beautiful, flowing from his higher and cultivated mental conceptions.

MODELS FOR HABITS.

MEASURE.

¶ 71.——The measure for constructing a model for a Habit is taken in the following manner: first, take the measure of the figure from the bone of the neck (7th vertebra) to the waist, and term it back length; next take the measure from close under the arm (fovea axilaris) to the waist, which measure is termed side length, continue this downwards to the ground, which is the skirt length. Secondly, cause the arm to be held in a right angle with the side, and the forearm to be bent at the elbow, also in a right angle with the upper arm; then take the measure from the centre of the back to the elbow, which is the elbow length, continue from the elbow to the hand, or as far as the sleeve is to reach, which is termed sleeve length; afterwards take the circumference of the arm, if the sleeve is intended to be tight, but for a loose sleeve this measure is not necessary. Thirdly, take a measure from the upper end of the sternum down to the waist, and from thence continue so far as the length in the front may be required, the first of which is termed front waist length, and the second front style length. Fourthly, place the measure as close up under the arm as it can be done, running behind over the shoulder blades (scapulæ) and in the front above the bosom, being particular to take it as tight in the same time as it can be obtained. This measure is termed breast measure (thoracial circumference). Place the measure a second time in the same position, round the figure, except that in the front it must pass over the most prominent part of the bosom, (over the mammillæ) taking the measure easy. This is termed the bust measure, to distinguish it from the breast measure. Lastly take a measure round the smallest part of the waist, and make it half an inch tighter than it can be obtained by measurement, which is termed the waist measure. These are the only measures which it is essentially requisite should be taken for the purpose of constructing a model. Fashion sometimes demands minor ones, as for instance in the length of a polka skirt, or a cape, &c., which however are not such as to require an especial direction.

The form of putting the measures down is as follows:—

Inch	13½	Back length.	Inch	19	Elbow length.	Inch	30	Breast measure.
„	7	Side ditto.	„	29	Sleeve ditto.	„	33	Bust ditto.
„	50	Skirt ditto.	„	11	Front waist ditto.	„	22½	Size of waist.
			„	6	Front style ditto.			

¶ 72.——The proportion measure by which the model is constructed is made as follows; first, take a narrow strip of paper, grant B C, (fig. 1, pl. 32,) to be such, and in the same time equal to the bust measure; A B equal to the breast measure. It is necessary to remind that the widths are always taken in their half quantities in the proportion measures; A B is halved in D; B D halved in E; B E halved in F, and lastly B F is halved in G; B G is taken as one unit; hence B F = 2 units; B E = 4 units; B D = 8 units; and B A = 16 units. The division is invariably made in this manner, whatever the size of the measure taken from the figure, let it be ever so large or small.

Between the breast measure A B and the bust measure B C there is always a difference A C, which is termed the bosom difference (B D). This difference, in a female figure, which is not very much abnormal in the dimension form is in most cases equal to 1½ inch, (that is in the half size as mentioned above,) or nearly so. For this reason it may be observed: if the difference is not found on the measure to be nearly equal to 1½ inch, that the measure has not been taken correctly; the breast measure being taken too large, and the bust measure being taken too small. Under these circumstances the former measure may be taken less, and the latter somewhat larger; so much so in both instances that the bosom difference shall be equal to 1½ inch.

The A D must be halved in *o*, and B *o* is termed the normal size of the waist, (N), this means the bust size in the sense of taste in relation to the thoracial circumference (breast measure). Below this normal size B *o* is a line denoted by R. This line R means the real size of the waist, which is the true measure taken from the figure. We now compare these two quantities R with N, and if we find that R = N, we say the form of the figure is normal in the size of the waist, and there is nothing farther to observe with regard to the size of the waist, except that the model is constructed normal in this respect also.

Fig. 2, on pl. 32, presents another measure similar in every respect to the former, except that the real size of the waist R is here given less than the normal size B *o*; hence the difference D^-, termed negative difference. A second case is presented by the line R′ where the real size of the waist is greater than the normal size B *o*; hence the difference D^+, which is termed positive difference.

PROPORTIONATE FORM.

¶ 73.——Fig. 3, pl. 32 presents the hind part of the model for a proportionate figure. The proportion numbers (co-efficients) are all determined by the proportion measure, as A B = 2 on the hind part are equal to 2 units of the measure, and so on with the remainder, except the side length C D, which is directly determined by the measurement of that length from the figure. E D = $\frac{1}{2}$ is taken off from the hind part as the line E F shows. In the same time it is not unimportant to remark that all these proportion numbers are deduced from the real figure, treated of in Anthropometry.

In constructing the hind part we proceed in the following order:—first, determine D C; then C B; afterwards B A. Having gone thus far, apply the back length taken from the figure, and if E A be found equal to it, we may know that the figure is proportionate. Second, erect perpendiculars upon D A in every one of the points D, C, B and A, and determine the ordinates as the proportion numbers (co-efficients) show; lastly, the style lines L M and N O are drawn as seen in the fig. 3; and the style form A L M N O is distinct from the ground form A G H K F E.

¶ 74.——The forepart belonging to the proportionate hind part is presented in fig. 4, pl. 32. First, A B is made equal to the side length, as the measure directly gives it taken from the figure; B C, C D are determined by the proportion measure, as the proportion numbers show; second, we erect the perpendiculars E D, C F and G B, making B H equal to the bosom difference; draw I H K, E F, and G L. Halve O H in P, and take a point Q, so that P Q = $\frac{1}{4}$. Take the form M U broad according to the style of the time and good taste; draw Q M and shape the curve Q M R by free hand; draw out from the centre Q with the distance Q M a curve M S, and with the distance Q R a curve R T; deduct M U of the forepart and F E of the hind part from the normal size of the waist, and then make V S equal to the remainder of the size; lastly, shape the curve Q S T similar and equal to the curve Q M R.

To obtain the form in the shoulder, we place H G of the hind part in F E of the forepart, in a similar manner to that in the construction of models for Dress and Frock in parapraph 26. The line W X will be the result, but here the curve W Y deflects in the direction Y Z, in a reverse direction from Y X. The rest of the curves are drawn as seen at fig. 4 by free hand, and need not further explanation.

BROAD FORM.

¶ 75.——The hind part fig. 5, pl. 32, presents a part of the model for a figure which is broad in its form. First, draw a line A B, make A C equal to the side length, and proceed with C D and D B exactly as in the foregoing hind part, paragraph 73, and as the proportion numbers indicate; this done, we apply the back length; finding that A B is longer than the back length, we know that the form of the figure is a broad form in relation to its height; we draw another line E F, and make E F equal to the back length. After this, we make E G equal to A C, equal to the side length. As now the side length is precisely given through measurement of the figure, it must follow, that all the shortening is in G F. To bring G H to H F in the same ratio in which C D is to D B, it is only necessary to observe that C B is equal to 8½ units; such units being described in the proportion measure, paragraph 72. For this reason we halve G F in I, and halve again I F in K, take a point H above K as much a ¼ of an unit; then the ratio is as nearly as needed obtained; because G I is equal to 4 units, I K equal to 2 units, and K F is equal to 2 units; hence G F is equal to 8 units; therefore G K is equal to 6 units; and as G H is more than 6 units, and F H less than 2 units, so it is undoubted that the ratio G H to H F is very near C D to D B. The remainder of the hind part for a broad form is constructed as the hind part fig. 3 has been described, and does not require any farther explanation here; besides the proportion number define such quite completely.

¶ 76.——The forepart of the broad form is presented at fig. 6; the manner of its construction is the same as has been shown in paragraph 74 as the forepart for the proportionate form. The form in the shoulder of this broad forepart, is decidedly different from that of the proportionate forepart, which arises from the difference between its hind part fig. 5, and the proportionate hind part fig. 3, and should not therefore occasion any surprise to the student.

In the fig. 6 we may in the same time remark upon the case of there being in the size of the waist a positive difference (D^+) as already has been alluded to in the paragraph on the measure. Here it is meant to explain how this D^+ is to be distributed in the forepart of the model. After the normal form is constructed, it is only needful to add, in the region of the waist in the model, A B = ½ D^+, and in the same time add C D = ½ D^+ to it, see fig. 6, pl. 32; draw the pointed lines at C and B and the forepart is finished.

SLENDER FORM.

¶ 77.——The hind part of the model belonging to a slender female figure is presented by fig. 7, pl. 32. First, we draw a straight line A B; make A C equal to the side length, as was done in the two previous instances; make C D as well as D E as large as the proportion numbers show. Having done this, apply the back length to A E, and if it is found that this length exceeds A E, it shows that the form of the figure from which this back length is taken, is a slender form, and we make A B equal to the back length, keeping the difference E B carefully in mind. Now we erect the perpendicular in B, upon B A, and proceed with the construction of the remainder of the back part, as shown in that of the preceeding ones, and as the proportion numbers sufficiently indicate.

It must be by itself evident that the procedure of adding the entire increase on the top is correct: because A C is a measurement given directly from the figure; C D is determined by the proportion number of the breast measure, and the breadth of the arm must occupy the space F G; hence there is no other place where the figure could naturally receive this increase E B, which was actually obtained by taking the back length direct from it. The hind part A B F G H for a slender form is therefore correct. The line of the style form in K I is not always made use of; it is sometimes not drawn at all, at others laid more towards G, inclining more towards H, and receding from I; but this is of no importance and may be done quite at liberty.

¶ 78.——The forepart, belonging to the hind part fig. 7, is presented by fig. 8, pl. 32. This part of the model also is constructed as those previous, except that A B is made equal to E B of the hind part. The form in the shoulder of this forepart, so different from the other two, must not either surprise the student, as it arises from the mere increase of A B and E B in the height of the axilla on the figure; and hence the form in the model.

This perhaps is the most suitable place to show how the negative difference (D^-) is distributed on the model, in case there should occur such by the measure. After the normal form of the model is entirely finished, deduct from C D the quantity E C = ½ D^-, and draw the pointed line F E G; see fig. 8. In the same time deduct the other half in fig. 7, namely take from A H the quantity H L = ½ D^-; and lastly draw K M, M L, so that the point M G = ¼ H L.

In regard to dimension we have now treated upon all kinds of forms in the model according to the female figure, namely, proportionate, broad and slender forms. We have considered also those cases which may arise in the size of the waist, that is, that each form may be normal, positive or negative in the waist circumference. Normal means that size which the waist has in an aesthetical sense (that is in the sense of the beautiful) in relation to the size of the breast (thoracial circumference); positive means to exceed, and negative to be within the normal size. We shall now pass on to the rest of the plates belonging to a Habit model; but before which we must not neglect to observe that all these models are constructed in regard to position, as if the figure in this respect were normal; if the figure should be abnormal in position, that is round in the back, &c., &c., to which the model is constructed, then such is to be varied according to the rules given in paragraphs 30, 31, and 32, on the variation for dress and frock for the male form; because position is the same in the male and female forms, but the latter is very seldom abnormal in its position, although often so in dimension.

SLEEVE.

¶ 79.——The sleeve part of the habit model is a matter left almost entirely to the guidance of choice and fashion; see fig. 1, pl. 33; still there is something calling for observation, which does not appertain to either, namely, that A B $= 2\frac{1}{2}$ is always the required quantity, because the breadth of the hind part keeps uniformly the same in the direction across the lower angle of the scapula. Farther, A C is always equal to the half of the axillar line (arm hole) of the model; A C is halved in D, and D E made equal to 1 unit of the measure, if the shoulder remains unaltered, otherwise this quantity is increased or decreased according as the shoulder of the model is made narrower or broader. In the rest of the sleeve part there is nothing to observe more than that it is drawn easy, and by free hand, suitably to the changes going on at the time.

SKIRTS.

¶ 80.——The skirt as figs. 2 and 3, pl. 33 show, is very simple; but there is one particular accompanying it which must be borne in mind, namely that A B fig. 2 is the breadth of the cloth, double, and the same is to be remarked of A B fig. 3, which is also the breadth of the cloth lying double; A C is on both the figures 2 and 3 the entire length of the skirt from above the hip to the ground, and C D is equal to $\frac{1}{2}$ A C; so namely, that the whole length of the Habit skirt is one half longer than the entire natural skirt length of the figure. Sometimes it is made even longer than this. Fig. 2 is the hind part, and fig. 3 the forepart of the skirt.

It is sometimes the case that the forepart of the skirt is slanted off towards the top, as seen at E F in fig. 3. In this case G H must be halved in K, and a perpendicular be drawn from K upon F G, and the curve from F to H drawn by free hand, cutting away the sharp angle F K H. Also L B must be halved in M, and E N drawn; and lastly if fashion requires it, as at the present period, then the curve E O must be drawn suitably to the front part of the model in the forepart.

The small jacket skirt belonging to the Habit is shown at fig. 4. Here A B is made equal to about $5\frac{1}{2}$ inches; a perpendicular line C A is drawn in A under a right angle to A B; the right angle C A D is halved in the line E A, and this obtuse angle D E A is again halved by the line E F, thus E F is prolonged to H. This being done the skirt is folded together, as represented at fig. 5.

The polka skirt, much in favour at present is shown at fig. 6. First draw A B, fix the length of the skirt A C; make C B $= \frac{1}{2}$ R; draw out of the point B with the radius B C the circular line C D E; make D E $= 3$; B F $= 1$ unit of the proportion measure. Draw F E G; let a perpendicular D H fall out of D upon F E; make H G $=$ A C, and draw the curve H D C by free hand, similar to the full drawn out curve in the plate given.

Of the proportion measure fig. 7, there is nothing more to observe than that such is the same as the foregoing, which has been fully explained in its place. Fig. 8 is a form for a collar which may easily be drawn by free hand, or imitated at sight.

MODELS FOR OVER HABITS.

¶ 81.——To be able to construct a model for an over Habit, as in the case of a Polka or a Paletot, construct first the model of the regular Habit, and after this is done, make the proper increase suitable to the purpose of being worn over. Pl. 34 presents a Polka Habit model which can be worn outside, and still go easily to the figure should there be no under Habit. Fig. 1 upon this plate shows the hind part A B C D E F of the regular Habit model; and the increase ¾ round the shoulder and back as well as the increase at F, namely F G = 3½ which give the hind part of the desired model. H I M N belongs to the hind part, and H I K L G is the side of the model.

Fig. 2 presents the forepart of this model. Here A B C D E F is the part of the regular Habit model, where the increases show the form of the intended model, that is G H = 1¼; D H = ¾; H I = ¼ &c. &c. as the numbers indicate. Farther draw a line L M, and halve it in N, draw O K through the point N, and take out the piece K N O, the width of which must be guided according to the closeness or ease which the wearer wishes; sometimes there is nothing taken out. If the length of skirt of the hind part A N = 12 units taken from the proportion measure, then the skirt of the forepart M P = 14 inch units. See figs. 1 and 2.

Fig. 4 presents the measure according to which the model is constructed. The sleeve part of this model is constructed as indicated by the habit model, or sometimes as fig. 2, pl. 35 directs. The collar part is similar to that shown in the habits, but most frequently as presented under fig. 3, pl. 34.

This collar part of the model is very elegant, and its construction is the following: first make A C = 1½, A B = 4½; draw from the point A, with the radius A B the circle B D E; make G F = F D, draw out from A with the distance A G the pointed circle line G H; and after this, draw out by free hand the curve as seen by the full drawn curve G H; make D I = ½, and draw the curve B I E by free hand, Lastly, draw out by free hand another curve I K, so that K L = 1 is the height of the stand, and K H the breadth from the turning curve I K.

¶ 82.——Fig. 1, pl. 35 presents a model for a paletot. First A B C D E F is the ground work of the hind part of a regular habit, where the increases are made round the shoulders and back, as the numbers sufficiently denote; but to obtain the increase in the side, we make G H = 1, draw H B, and erect upon B H a perpendicular H I; make H K = G E, and K I = 2. The rest of the form is self-evident, the length being made as required, but it must not reach lower than to half the length of the thigh, or otherwise quite to the knee; to be any longer than this looks extremely bad and ungraceful.

Fig. 3, pl. 35, presents the forepart of this model. Here again A B C D E F G is the ground work of the regular habit, and the proportion numbers sufficiently show the increase so as to render any farther explanations needless. But it may be observed by this model also, as it was observed of the former, that if A L = 15, as skirt length of the hind part, then it must follow that G H = 16½ as skirt length of the fore part.

The proportion measure fig. 4 is that by which the model is constructed. The sleeve part fig. 2 is first constructed as shown by the model for the Habit, after which the form A B C and A D E is drawn by free hand. F G is without a seam; A B and A D are joined by a seam. The point H of the sleeve part must be put in at the point I of the fore part; and the point G at the point M of the hind part.

All those lines which do not belong to the ground work, but solely to the style of the model, may be varied according to pleasure, still it must be borne in mind that such variations can never be made without carrying the human form in the mind; accordingly every style line must have its form and direction more decidedly to the figure if the garment shall preserve a fit or closeness to it, and be less expressive of the outline of the form if the apparel is to be loose or easy. See the form round the shoulders and in the side. To these sort of curved lines belong also the side curve of the hind part; namely H I of fig. 1, pl. 34. This side curve H I may be placed sometimes nearer to A, at others nearer to F, but wherever taste or the character of the article requires it to be placed, the curve must always run so as to maintain a similarity to that drawn in the models. What is here affirmed of this particular curve in fig. 1, is equally true of the corresponding curves in the Habit models on the plates 32 and 33. In a general sense it may be invariably observed—similarly as the muscles by covering the skeleton form take away its sharp angles: and even so as the skin and other particles under it conceal the abruptness of the hollows of the muscle form, without ever disturbing or destroying the gentle outline of the human figure, in the same manner must the apparel, or in other words the clothing or drapery never destroy or distort the form which it covers; whether the clothing is close or easy and unconfined on the figure; the natural and elegant character of the human figure must never become obscured under the hand of an artist, as we so frequently witness that it does under the hand of a bungler, who is at all times too young or too old to learn, and then making an outcry for protection when his trade is languishing through his own idleness and selfishness. It is to obtain this perfection in modelling that scientific knowledge is valuable to the artist; for scientific art can create, obtain and achieve that which without it never could be attained.

In the conclusion of this article it may be worthy to observe the following: the integral parts out of which a piece of art consists are often termed in scientific language, elements; we may therefore thus express ourselves in reference to the idea of æsthetic (the sense of the beautiful); a thing may be beautiful in art as well as in nature, if suitable elements making up the entire thing are all in harmony with each other. From these truths we may therefore deduce the rule, that the garment as an integral part of the clothed figure, must harmonise with the unclothed figure for which it is intended; the material as well as the form of the garment must suit to the purpose and the occcasion for which it is required, and lastly the integral parts of the garment itself must also have suitableness to the same end, and harmonise with the entire. All this must be brought first into the model, after which model the garment is to be formed, as is done in the accompanying plates; for whatever is neglected in its construction, will of necessity be neglected in the apparel or drapery of the figure.

When this rule is observed the apparel may be so arranged to, and laid on the figure, that an otherwise menial looking person may appear more beautiful and refined than the same would in a set of garments of unscientific and bungling hands; but notwithstanding all this, on a sloven, without intellect or morals, the apparel will never lay so gracefully and elegantly easy as it does on the figure of a morally and mentally endowed person. There is something in the carriage which gives the air of nobility to the form which the material element can never create, but which it may preserve when it is already in the form. Such is therefore left to a higher immaterial element, which through learning must be as a collected being in our consciousness. The painter and the sculptor who strive to create life in a piece of art, have to watch this either in a representation of the human figure, naturally or clothed. But the artist whoever he may be in constructing the model for the drapery must never neglect the mind of the person on whom he is engaged, or he will fail in making the result of his labour correspond to that superior mind, and its external form.

MODELS FOR OVER GARMENTS FALLING TO THE FIGURE.

¶ 83.——Models for over garments are constructed by the same measure as those for dress garments, except that the proportion measure used for an over garment model is taken of the next size larger than that for a dress garment, which is the exact size of the human figure. For instance, if the measure taken from the figure in the breast (thoracial) circumference, were 18 inches, a measure of 18½ must be used; or if the size were 17½ it would be necessary to construct by 18. The proportion measure fig. 1, pl. 36, is that by which the models are constructed, as is already explained in former paragraphs, and with which we are especially acquainted under the head Mensuration. Here A B is granted to be equal to 18½ inches if 18 was the measure given; or A B is equal to 18 inches if 17½ was given as the breast measure. In a similar manner as the proportion measure A B is taken ½ inch larger than the exact size of the breast measure, so also the size R is to be taken as much as ½ inch larger than the size of the waist given. The same rule is to be applied to the ground length, that is, to use the next size larger measure by which to construct than that actually taken from the figure. Here we must make a few remarks, although such have been already brought forward in the part treating upon measuring; namely, that many artists take a measure habitually very easy, while others again take it extremely tight; and few have the tact to take it perfectly, neither too tight or too easy. This arises from carelessness and thoughtlessness. It is therefore needful to repeat that to take a correct measure, the careful attention of the student is demanded, with repeated practice before he can hope for much success; keeping closely in his application to the rules laid down in that part of this work on mensuration.

Although constructing a model for an over garment by the next larger size measure than is used for that of dress and frock, still the model for this garment would not be large enough, and further, the using of a still larger sized measure would neither answer, because the model requires to be increased in certain parts, but not in all, which could not be accomplished by merely constructing it from a larger measure, as shall soon appear.

¶ 84.——The original idea for constructing a model of an over garment is presented in fig. 2, namely, where a model constructed for dress, was cut up under the arm A B, and opened ½ inch; opened as C D equal to ¾ inch; and opened at E F as much as ½ inch; added to in G H ¼ inch; so that in G it came off to nothing, and in H there is only the full addition of ¼ inch; further the surface was opened at IK as much as ¼, and lastly added to in L M equal to ¾ inch. Now to construct a model at that period of his knowledge, with these increases through the means of co-ordinates, was not possible for the artist, because not knowing the definite proportions of the human figure, he was at a loss even to construct a plain model, and the best he could do was to produce a few middling sizes; still less was he able to construct one requiring variation through the position of the figure, style of dress, or that the garment should be an outer one—hence modern drapery so tasteless in the productions of art, when otherwise ever so beautiful.

We see in this case, the construction of an over garment model, that the variation consists more in the increase of certain parts of the model, and not in all parts; as for example those in the direction of the shoulder, which are increased in length but not in breadth; hence a larger sized measure, even under the same proportions would not answer, as there are certain ratios in the model to be varied.

¶ 85.——Before proceeding to explain which numbers expressing the different ratios are to be varied, it is necessary to remark that the method of proceeding in the construction of models for over garments is quite the same as that already described in the article which treats of the construction of models for dress and frock, and therefore it is only needful to name the special parts of increase. Firstly, fig. 3, increase the dorsal region, so that C D = 7¾ instead of 7 units, as in the dress models, making the increment ¾; make C E = 8¼ instead of 7¾, thus the increment is ½; make A B = 3½ instead of 3; B F = 1, and the different increases in the co-ordinates C D, C E, &c. &c. are determined which were necessary in the back part, in consequence of the garment having to be worn over another. Now place the measure of the natural length of the back on the hind part ¾ lower than A, say from G, and lead it to H, because the garment will carry up thus much in overlaying another, and if the figure is perfectly formed, the length of the hind part G H will agree with the natural back length; or it will reach a little beyond H if the figure is stooping or round shouldered, and the reverse if the figure is very upright. Farther proceed as in the case of the models for dress. The length H I downward from the natural waist H is made at liberty, or as long as the style of the time requires it. But this model being for a plain great coat, it is made after the numbers given. Secondly, the co-ordinates in the fore part, fig. 4 are increased as follows:—A C = 5¾, instead of 5½; E D = 3¼; F C = 8¼; A B = 10, and B G = 3. The point of inflection in I at fig. 4 is equally correct, as the H I = 1 or 1¼, and this is ¾ less than the depression or indentation in the human figure, and consequently it is also ¾ less than in the models for dress. These increases have the most effect in the diagonal K G I, which if it were really drawn and measured would prove to be so, when comparing it with the same diagonal in the model for dress. The result in fig. 4 is the same as that produced in fig. 2, but the proceeding in fig. 4 is easier and more practicable under all circumstances, although the principle in both is equally correct.

The skirt part of the model, fig. 5, is produced as that in the models for dress, and for this reason need no further explanation. The collar part of this model, fig. 6, presents neither anything requiring remark, as this is also the same as described in the model for dress, but with the slight difference which is presented in the collar model, fig. 1, pl. 38, sufficiently indicated by the proportion numbers and the co-ordinates.

The sleeve part, see fig. 2, pl. 37, is in a model of this description, which is constructed for a garment to be used as an outer one, somewhat different to that for a dress model, and which difference is first, that the distance from the centre of the back to the pectoral height A C is full a ½ inch more than that distance is in a dress model, reckoning for carrying up. For this reason make B C = 3½ or 3¾ instead of 3¼; and if for a figure round in the back allow still more, say 4 instead of 3¾. Second, there is this difference, that in fixing the elbow D in a dress model no seams are allowed, but in the model here described the seams must be allowed for, which go off in the breadth of the hind part, and in B from the sleeve part, by putting them together. And lastly it may be observed here that whatever greater breadth the back is in a model for an over garment than its normal breadth, C B must be made always equal to 3½. The size B A is equal to the half axillar curve (arm hole) usually equal to 8½ units, instead of, as in a dress model 8 units. The mode of construction is here again the same as before, and calls for no other explanation, and what is said of the sleeve part of the model is also applicable to the sleeve part in pl. 38 and pl. 39. The width of the hand and elbow is much at liberty; a good proportion at the elbow D E is equal to 7 or 7¼; and the width at the hand is 6 units.

¶ 86.——When first the principle is understood by which models for over garments are constructed it is extremely easy to construct any model for them, whatever kind may be in demand. The variety of names which are given to them relate more to the style of the article, and not to any principle in their construction. It is therefore necessary first to understand the principle of constructing over garments, before entering into those varieties of style; and it must here be observed that all varieties of form, in position as well as dimension of the figure, are in the model now described treated exactly as was instructed in the paragraphs on dress and frock models. It may not be superfluous to state that just so much as the size of the model here is larger in the thoracial line (breast) than the actual breast measure, so much larger also must be the size in the waist of the model than the measure of the waist. The usual difference is from 1¾ to 2 inches.

With this preparation we proceed to the style of models for over garments. Among them there has always been one termed the Israelite or Jewish Pelz. The Polish as well as the Russian Pelz are in their chief parts the same especially in form, the difference consisting of ornaments. Indeed all eastern over garments are of this kind of form. It has no seam in the back, neither in the waist across, but a seam in the side from under the arm down the length of the skirt; sometimes the seam is placed a little more backward, and occasionally quite in the side, about in the half of the figure.

This gave the idea which led to the construction of a model of the same form, but only reaching to the knee, whereas the Pelz reached to the ankle. A collar was also added, which already the Russian had adopted, (the eastern had no collar). Such an over garment was known by the name, "Taglioni," and it looked very well when not too tight, but allowed to fall loosely. But the English fashion at that time 1835, when the Taglioni came in demand was such that people were screwed and strapped up in their clothes, and consequently this style of garment was too loose, while it was not easily made close to the figure, and at the same time to look well. From this circumstance a model was suggested wherein the hind part had a seam as in a great coat, see fig. 7, pl. 36, with the side formed wider than a great coat, but not so wide as a Taglioni form. The side line in the hind part was, by the ignorant, which is always the greater number, not drawn in uniformity with and naturally to the figure, but independant of it, as if the figure had nothing to do with contraction of the model; but only the learned artist can preserve a natural and beautiful form. Of this better description is the model we present.

The forepart of the model was divided under the arm, and behind in the waist as represented at fig. 8, and C D made equal to A B; this gives a really elegant model of an over garment, but at the time of its introduction not known by any especial name. The groundwork which lies in the co-ordinates is unalterably the same in this model, as it is in those given under figs. 3 and 4, of this plate. The model fig. 8 is constructed also the same, whether the garment is to have one or two rows of buttons, or whether buttons are put on the hip or not.

¶ 87.——Although the model just described gives an elegant and agreeable over garment, still there was and is yet a lingering towards the more remote, as if the mind were reluctant to lose the ancient, and would if possible modernise it, but at the same time produce it in greater beauty: under this idea another model was designed, figs. 3 and 4, pl. 37, approaching more nearly to the eastern in style and form, except the collar and lappel parts, which the model presents. The groundwork here is the same as that in the models just described, except in the side: namely, to obtain the line A B C in fig. 3, the point A of fig. 4 is placed in the point D of fig. 3, so that A B of the one lies in the E D of the other, and in this position the curve C D E of fig. 4 marks the curve A F G of fig. 3; the point of inflexion F is marked, and according to the closeness desired in the waist F B is carried in equal to $\frac{1}{2}$ or not, or even less than F, as the softer line at F C shows; and either this latter line or the curve A B C is drawn. If the point of inflexion is taken as B, or left in F, the side curve is drawn the reverse from A F G. In case of taking B as the point of inflexion the C G = $2\frac{1}{2}$, but if F is retained as such, then C G = 3, and so still farther increase the number, if the point F is carried farther out so as to indent the curve in F less.

We see there is a law between the position of the points B and C, which so operates that if the one moves out of its place, the other must move also, or the ratio which these parts of the figure bears to one another would be destroyed. The closer the model is constructed, the sharper, and more exactly these points must be kept in observation; but in the case of its being constructed rather easy, this curve A B C runs less sharp, namely as A F C. If the model is close the garment is stretched in B, and the lining which is not of a yielding quality becomes a small wedge to make up for it, otherwise it will not fall naturally to the figure. A garment made according to this model is also very plain and elegant, if it comes from the hand of an artist. The sleeve part, figure 2, of this model is the same as has been just described in the former paragraph. This model received the name of "Tag," most probably an abridgment of Taglioni.

¶ 87.——Besides the Tag, there is designed another model as is presented under the figures 5, 6, and 7, pl. 37. This is termed the Tag great coat model. An over garment made from this style of model is highly becoming to the figure; as most styles when artistically made are agreeable; while the same styles produced by a bungler are most unbecoming and ugly, and leave the impression that the garments made according to them do not belong to the figure.

The construction of this model is clear from the foregoing, and it does not therefore require more to be said; but it is here the right place to compare fig. 6 with fig. 3 in the part which forms the iliac region (hips). In fig. 3 it will be seen that C G = $2\frac{1}{2}$; in fig. 6 we have C G equal to 1 only; now it must be remembered that fig. 3 has no spring in I from H downward, and fig. 6 has the whole quantity D A B;

so namely that the quantity C G + D B in fig. 6 is equal or nearly equal to C G in fig. 3. This fact must be borne in mind, that the entire quantity allowed for the play of the iliac region (hip) is unalterably the same, in whatever form of model it is given, and although it is given in ever so many parts, or in one undivided quantity. Fig. 1 represents the proportion measure by which the models on this Plate (37) are constructed, known from the former; and fig. 7 of the same plate neither needs to be explained, as it is also described in the paragraphs on Dress and Frock models. But it may be observed that in order to fix the spring D F of the skirt part, the side part C B has only to be placed on D E of the skirt, so that point C falls in point D, and the F D has to be drawn running even with I C of the side part. As shown in the foregoing, A B of the skirt is made equal to C B + D E of the fore and side part. It may be further mentioned that in this style of garment the lappel from F to H is often entire with the forepart from F to E, and a wedge only taken out in the place of K F L.

¶ 88.——The thought may here occur that the forms of style are exhausted, but it is not so; another model was designed for an over garment as presented by figs. 3 and 4, pl. 38, termed a Paletôt. This model had little original; not having a seam in the hind part was the style of the old Taglioni, and having the skirt flapping open in the side at A B (see fig. 4) instead of in the middle of the hind part gives the garment a bungling look, like an Arabian shirt torn open at the side. This unsightliness was not therefore adopted by any artist, and that persons of taste would not wear the garment was shown by their preference for another produced from the model presented under figs. 7 and 8, pl. 36; the forepart fig. 3, pl. 38, contains neither anything new in form, more than that the skirt is rather scant; for the line A B, which here directs the skirt part being drawn out from B, instead of from C, causes the skirt to flatten; and beyond this it is still farther flattened by sinking it in A about ½ an inch, as A D = ½ presents on fig. 3. The line E D is made larger by ½ an inch than F G which is for holding on, otherwise, as the skirt is somewhat scant it would look very unsightly.

Almost all over garments are at present comprehended under the name Paletôt; and yet it is a real fact by the side of this, that the artist, the manufacturer, and the wearer, taking them in general as a body, avoid out of absolute dislike to form, to manufacture, or to wear that identical article which goes under the name of Paletôt. The cause of this becomes clear when we point out that the human eye, from its natural cultivation in the beauty of form recoils from the straightness and stiffness so characteristic of the back part, which is a consequence of there being no seam, and besides, the unnatural flappish look of the skirt in A B, fig. 4. Equally faulty to the eye is the too great scantiness of the skirt over the hip in relation to the depression in the waist above the iliac region, which produces a stiffness in this part not in correspondence with the figure; although the paletôt is designed to be a garment falling easily and naturally to the form. Thus the purpose and the form are in contradiction.

¶ 89.——From these objections arose the suggestion of another model designed for an over garment receiving the name of "Piuma." This has a seam behind in the middle of the back. The forepart is therein different from the Paletôt, that the side part G F (see fig. 3, pl. 38) is placed in D E, and that, and the skirt part are cut out of one piece, having no seam in D G; but the forepart has a seam in E B going through to the front edge. The seam in the back part is like fig. 6, instead of the flap in A B in fig. 4.

¶ 90.——To produce the greatest simplicity and beauty, and to satisfy the ever restless mind of man in creating the new the true and the beautiful, another model is designed for yet another over garment. It is presented under figs. 5 and 6, pl. 38, and termed the "Teuton." This model and the other under figs. 7 and 8 on pl. 36 are the two most beautiful we think, that have yet been designed.

Fig. 6, pl. 38, has not always a step on the hind part as may be seen at A; but often has a slit up to A from the bottom. The forepart fig. 5 is very different in style from the Paletôt. The scapula line A B runs in a straight line with B C, and the hind part is placed with its scapula line B C in A B of the forepart, so that the point B falls in A; the point D is marked, from which the indentation is fixed, D E = 1; the point E of inflexion is marked and the proceeding is as usual.

Through this method that the scapula line B F of the forepart is placed in the direction A B, it causes the surface of the model in G H to be as much as 1½ inch too large. Hence we have the power to take out of this surface a wedge G B H, also its inverse wedge G I H in continuation. The lines G I and H I cut I from about 3½ to 4 inches below the part G and H, and the model is now constructed. But these lines I K and I L may be continued to the bottom of the skirt, and a model so constructed makes another variation in the style; but one not so frequently chosen, because a seam carried down the skirt on the side is not generally liked.

Of the measure fig. 7 as well as the collar part fig. 1 and the sleeve part fig. 2 there is nothing to remark, as these parts are the same as before described.

From the explanation of the foregoing models it must be quite apparent to the student that he should never allow himself to be carried away by names, but must fully comprehend the things, which he may do without however despising the names which they carry. So far as the thing itself is concerned in these models there is nothing essentially different between them. What difference there does exist is in style, the groundwork of each is not at all different, and never can be, so long as such models are for garments to be worn over others, and in the same time falling to the figure.

MODELS FOR LOOSE GARMENTS.

¶ 91.——In this paragraph we have those models to consider which are for loose over garments, termed full drapery.

To these belongs the plain or straight loose wrapper, as presented in figs. 3 and 4, on pl. 39. The construction is so simple, it will be immediately apparent by giving attention to the proportion numbers made on its co-ordinates. It has to be mentioned that the forepart in A B is as much as 1 unit longer than the hind part in C D; so that A B — 1 = C D. Also it may be farther observed that the hind part, in forming the shoulder must be kept in C as a centre, moving it round this centre, so that D E opens equal to ¼. In this Model will be perceived lighter full drawn lines than those heavy ones constituting the original model, which denote a second style of loose garment, termed the new Piuma. See first the fig. 3, the G H, the E K F, and the light full drawn line at C I D, mark the lines for this model. On the forepart fig. 4 is shown corresponding to the first the full drawn line H I. It is by itself clear that what the hind part loses, the forepart wins, as soon as the ground lines are placed according to the foregoing instructions.

Of the second sort figs. 5 and 6 on this same plate (39) present a model for a more loose kind of garment than the former, termed a Driving Cape. This description of drapery is often very full, and sometimes approaches a Cloak with sleeves. It is also made long for a carriage, and short, not reaching to the knee, for walking; sometimes it is made over the knee for travelling, and again for an Opera Cloak. In this last instance it is finished with a shawl collar, as fig. 7. When for travelling it has a collar as A shows in the same figure, 7, but for walking dress a collar as shown at fig. 8.

The construction of this model figs. 5 and 6 is first exactly as the straight wrapper just described, with the difference that we move the hind part in forming the shoulder fig. 6, round the vertex V so far until O M = ½, instead of, as in the other model only ¼.

As the Driving Cape model is always formed full in the hind part, and the fulness must be in A V B (see fig. 5) so we can move the piece V A D C in the position V B F E; draw F G and G H, and the hind part is finished. It is evident that A B = 1½ in this instance, may be far more increased, and made just as much as we like the quantity of the drapery to fall loose to the figure.

The forepart fig. 6 usually suffices in fulness as E G H B D represents; but if more fulness is required than this it may be proceeded with in a similar manner to that which has been done with the hind part; namely, by moving the part B A V in the position V C K, so that A C = 1 in this instance, or more properly so as to correspond with the increase made on the hind part. The ratio according to which these increases augment is 1½ to 1, if the fulness on each of the parts shall maintain a continual harmony. As we now presume A B D to be in the position C K L so is the increased difference of B D L K to the increased difference O H B K I M in corresponding ratio, and the entire increase of the forepart in correct ratio to the entire increase of the hind part.

It may not be out of place to repeat that in fig. 2 the quantity B C = 3½ or 3¾, however broad the hind part may be made by the increase: because the increase in the hind part is taken up in the region of the scapula, and therefore it may be considered as not in existence if we take the breadth of the hind part in relation to the height of the sleeve part. The measure fig. 1 on this plate is the same as that before described.

¶ 92.——The most elegant of loose drapery is the cloak, and the artist is the most lucky with this in draping the human figure; but it is curious, although so loose to the figure no part of the attire looks so bad as a cloak not well carried, and nothing looks worse than the quantity of the Cloak not being well adjusted or arranged to the figure in sculpture or painting. Form and carriage of the person are the chief considerations according to which the quantity in the cloak is to be regulated. It is for this reason necessary, first to calculate for a model the *right quantity* from the measure given of the figure; second to give the model that *form* which shall be just and correct to the form of the figure, otherwise the quantity of drapery can never be correctly adjusted to it. Some artists believe that they may proceed more indifferently with this article of apparel than they can do with those garments which lie closer to the figure; but whoever has acted on this belief has paid dearly for the mistake.

¶ 93.——Before proceeding to the construction of models for cloaks it is needful to mention that the proportion measure by which the model is to be constructed must be taken 1 or 1½ inch larger than the breast measure from the figure, taken over the waistcoat in the thoracial circumference; for example if the size, from the measurement is 18 inches, 19 or 19½ inches must be used. Under fig. 1, pl. 40, a proportion measure as usual is presented, suppose it to be of this mentioned size. The measure, it will be seen, is on a much smaller scale than those previous, because so much space would otherwise have been required for the models. And as will be easily perceived, the unit is in this instance made equal to ⅛ of an inch.

First is presented the model of a plain Cape, fig. 2, where A B is made equal to the length which may be chosen for the hind part of the figure. Next is taken the radius B C = 4, and a semicircle B D E G drawn from the centre C with this radius; a perpendicular C F erected in C; the chord F G is drawn; it is halved in H, and C I drawn; the chord B E again is drawn and halved in K, and C D drawn through K; D C halved again in L, a perpendicular M L is drawn in L upon D C and M L made equal to ⅓ L D; and lastly, out of M as a centre is drawn the circular curve A O I. This Cape model is made in A B often very long, or it can be quite short according to different purposes, still the construction is the same in every case. It is seen that B C E = 135° = 1½ R angle. The model does not necessarily require greater width, but less must never be taken, because this is the area of the axilla in the human figure, and generally correct. If taken under a less angle then the figure would have a confined and cramped appearance round the neck, well for a caricature but not in accordance with a tastefully or elegantly draped figure. If this Cape is put on a Cloak or any other garment the front part E does not reach quite to the end of the collar, and that by 1 inch.

¶ 94.——Figure 3 on this plate is termed a model for a ¾ Cloak. The construction is quite the same as that of the Cape model, except that the radius A B = 6 units of the proportion measure instead of 4. Farther C D = 1 is taken for a small step, and the full line D E A is drawn and held on in the neck E, so that in proportion the shoulder region gains greater fulness.

Fig. 4 is another cape model exactly constructed as fig. 2, only in this case is represented the method of arranging the capes if one is to be made to appear as several, worn in northern Germany, and as at present by the English coachmen. All the curves are drawn from the centre A; but the straight line B D is drawn from the centre C as C D terminates in B, and so with the rest. The distances E F, F G must be equal to one another, but each is taken equal to 1½ or 2 inches as may be chosen.

The next figure, 5, is a model for a full circular or Spanish Cloak. A B is in the the first place made equal to the entire length required behind. The radius A C = 3 units of the proportion measure; the circle is drawn from the centre C; a perpendicular C D is erected upon C A, and halved in E; E F is made equal to ⅓ E D, and out of the centre F with the distance F B the semi-circle B G H is drawn. In K as much as ¼ of an inch is hollowed, and in L as much ½ an inch is risen, the full line L D K A is drawn, diverging a little from the circular, and the construction of the model for a Spanish Cloak is finished.

It will be apparent that the model is constructed in the half, and cut out of the double material, thus making a complete circle. And although a complete circle is sufficient for the widest Cloak, still a model can be constructed for one of two full circles. For this case see fig. 6. The radius needs only to be taken equal to 2 units, equal A E; and a spiral to be drawn as D F G A, then D C will be the front, and A B behind. The second spiral drawn out from C coming home in B corresponds to the spiral D F G A, which solves the problem. These spiral cloaks are seldom worn, but it is desirable to know how the models for them are constructed.

There is sometimes worn a sort of cloak, which is termed the half cloak; fig. 12 presents the model of it. After the length A B behind is fixed, make the radius A C = 11 units; draw the circular line A D E F; make D G = ½; E F = 1; then draw out of free hand E G A; make A I = 1½, draw I K and F K perpendicular to each other in I and in F; draw K C, make D H = 3, and draw by free hand I H E. Now take I B and carry it all round on the curve I H I, so that H L = I B, and F M = I B &c. &c. Hold the neck G in both sides so much on that it quite fits to the collar part fig. 11.

If this half Cloak is to be made to wear over epaulettes then there must be a slight deviation in the construction, which is seen in fig. 13. The proceeding is the same as before, until we make B C = A B, then draw the two curves out of the points F, and N, taking out the curved wedge H A I; this is all the difference which is required to be made.

¶ 95.——There is a sort of sleeve Cloak worn in Russia, Northern Germany, and by the coachmen in England. Figs. 7 and 8 present a model of it, which needs scarcely any explanation, as the proportion numbers sufficiently define the whole of it. However it may be remarked that the part C D must be made equal to A B. The Cape model fig. 4 belongs to this one of a sleeve Cloak. The sleeve part A B C D, &c. belongs also to it, see fig. 9. In Russia a hood is added also to the sleeve Cloak, which is represented at fig. 10. The hood is folded together at A B, seamed in B C, and the curve A D is put on in the neck, so that the face, when the hood is over the head, comes in the line D C.

There is still another sleeve Cloak to be considered for which a model has to be constructed, and this is only to be worn over epaulettes. The model for this Cloak is constructed exactly as that just described in figs. 7 and 8; after drawing so far, vary as C D E F shows in the hind part fig. 7: and the forepart fig. 8 being drawn as usual, is varied also, as A B E F shows. By these means the epaulettes are kept free from the seam which would wear off the gold, and the owner of them does not fancy copper ornaments on his shoulders. On the hind part it will be seen that C D = 2 inches, and on the forepart A B = 2½ inches. But this narrowness of the shoulder part and the projection of the epaulette call for the greater quantity in the top of the sleeve part; for these reasons it is needful to make A E of the sleeve part equal to G E of the hind part, and then draw out of the point F fig. 9 the circular curve E G H, after which deviate slightly as the full drawn line shows and this completes all that is required to be done.

The collar part fig. 11 belongs to either Cloak or Cape, and its length A B is from 10½ to 11 inches without seams; it is rare to make any collar part longer than this. The breadth A C is from 4 to 4½ inches. The form is quite evident, as it is almost straight; sometimes it is constructed perfectly straight, which however is not in such good taste, as it is more stiff looking on the figure.

BREECHES MODELS.

¶ 96.——We have already spoken of models for servants' garments in paragraph 44, pl. 17, where a model for a coatee, a dress, and a single-breasted frock was given. Also in paragraph 85 reference was made to a model of a garment to be worn over in general. This same model still farther serves for a servant's great coat, only requiring the addition of a cape. This cape is to be seen in fig. 2, pl. 40.

In paragraph 95 a model for a sleeve cloak is treated of, serving in the same time the purpose of a box coat model, as figs. 7 and 8, pl. 40 present. To this model there only needs to be added the cape model fig. 4 on the same plate, 40, which makes the box coat complete.

Models for servants' vests are sufficiently clear from those vest models treated of in plates 22 and 23; only there is farther to be considered the sleeve part of a model for a servant's vest, which is however the same in form as that belonging to a stable jacket.

¶ 97.——*A stable jacket model* is produced if we first construct a servant's plain frock model, according to the instruction given in ¶ 44, pl. 17; and afterwards, the model being thus obtained, in this case from the measure. fig. 4, place it as represented in figs. 1, 2, and 3, pl. 41; then vary the model as the variation on its parts sufficiently indicate.

First; vary the hind part fig, 1, as the numbers marked upon it determine; make the length A B equal to the measure taken. As through the variation the C F has become less than the original line D E, and D E of the hind part equals A B of the forepart, fig. 2; it is therefore needful so much to shorten A B, that C B of the forepart becomes equal to C F of the hind part; after this draw the line C D E. Farther, add in the F of the forepart a quantity equal to that presented by the numbers given, instead of secting the side part and adding it in the side at G; make H I of the forepart equal to H G of the hind part. Lastly draw I K, K F, and this finishes the forepart. Such a variation of the model is evidently correct if we bring to mind that the object is to construct a model which shall be more easy than that for a frock, and besides this that the unyielding material of which the stable jacket is composed, and the increased seams which are made in it, demand such an enlargement of the hind part, as well as the narrowness in the shoulder of the forepart.

The sleeve part fig. 3 is by itself clear, as the variation at A B C D shows, and which answers not only for this model but also for that of a servant's vest, whereas the original E F C G belongs to the Frock model. That this variation of the sleeve part is correct becomes evident when it is considered that in the vest model there is a half unit more taken out in the pectoral region, than is done in the case of a Frock model; and farther that the shoulder is narrower in the deltoid and acromial regions in the case of a vest model than in the same with a frock model; precisely as with a stable jacket model. Hence the correctness in the increase of the sleeve model. From this explanation the natural form of the sleeve part must have become clear, and with it also evidence that if there were no Frock sleeve, still the sleeve part of a vest model may be constructed so as to be easy, according to the size of the axillar line, (armhole) of the vest model, in the same manner as intended in ¶ 29, on constructing the sleeve part.

¶ 98.——*A Breeches model* is not only different in style from a trousers model, but it is also in some degree different in its ground construction. For this reason it is necessary to direct especial attention to the size of the knee measure employed in the construction of a breeches model, besides those measures which are used in the construction of a trousers model. The difference between taking the measure for a breeches and trousers model will be remembered from paragraph 4, Mensuration. The proportion measure, as the primary element employed in the construction of all models, and which is also used in the construction of those now being considered, is presented at fig. 5, pl. 41.

The fig. 6 is a breeches model for a groom, as seen in the curved lines A B C D, D E, and E F. The breeches model for a footman or dress servant is presented under the same figure, 6, not drawn curved as B shows, but straight as the line A C indicates, and farther as indicated by the lines C G H F for the front part. The hind part K answers for both models. The construction of these two is in the ground work evidently one and the same, and there is only the small difference to be observed in the style of the knee.

The manner of constructing breeches models, so far as relates to the upper part, is the same as that which is instructed in the paragraphs on constructing models for trousers, with the exception only that in the model here given for breeches, the stride is much larger, which will be sufficiently distinct by a comparison. The greatest difference between these models lies therein, that the knee part C (see fig. 6, pl. 41) much recedes from the normal point M, whereas at this point M, the knee part of a trousers model remains. To define the position of the knee part in C, make from the point L out $M L = \frac{1}{4}$, and also $L N = \frac{1}{4}$ of the size of the knee measure, taken tight, and $M N = \frac{1}{2}$ size of knee. Halve M L in C; draw the straight line A C and also the straight line O N; now draw the curved line A B C G D, most curved in G, so that G D falls perpendicularly in D upon D E. Farther let K I recede sufficiently according to the size of the knee, and also according to the size below the knee. The length O E and A D of the model is made equal to the length of the measures taken from the figure, plus 1 or ½ inch.

¶ 99.——The model fig. 7, pl. 41 presents that for a gentleman's breeches. The difference between this and the former model is first in the stride, second in the position of the knee part, which will by comparing them become evident. The position of the knee part is determined if M L is first halved in C and afterwards M C halved in D, which is the required point, and fixes the position of the knee part.

By comparing the portions of the knee parts in these two models, figs. 6 and 7, we see that D does not so far recede from M in the one model as the point C recedes from M in the other. And farther, as the knee part takes its position according to the position of these points, there is a difference in the form of the model springing out of the position of its parts. This difference arises in consequence of there being more length in fig. 6, and less in fig. 7, produced in the inside of the leg line, suitable to the purpose of the model required, the one being for a servant's and the other for a gentlemen's garment, different in wear and style. It is from the foregoing clear that the original points M and N are found from the centre L out, as $M L = L N$; it is to be understood that N is equal to half of the whole size of the knee. This same is true of the corresponding points in figs. 8 and 9.

The model under fig. 8 is for a *leather breeches.* There is nothing in the ground work different from the preceding models, but only a difference in style, as is seen by comparing them with each other, except that the hind part in the stride is ½ a unit of the proportion measure larger than the same in any of the foregoing models. The difference in style is chiefly in the leg at the knee part, as well as that the whole model is rather large to the measure taken from the figure, on account of the shrinking quality of the leather. Hence, although the ground points M and N are fixed from the centre L out, according to a tight measure from the figure, still the whole size round the knee is, as seen on the model, one good inch larger than twice M N. As B D is alone equal to M N, and $B A = 1$ full inch; therefore $A D + D B > 2 M N$, as much as A B. In fact the model is that of a groom's breeches, rather long and wide (large) with the exception that the style does not allow the side seam to lie so far towards the front of the knee as it is preferred in a groom's breeches style. In conclusion it is needful to remind that in a breeches model the placing of the measure for the leg length must be in a slanting direction from D to A. See fig. 6.

¶ 100.——The model fig. 9, plate 41 is that for a *servant's trousers*, wherein a little deviation is made from the usual mode of constructing models for trousers. This is done merely to show that the mode of fixing the position of the knee part may also be employed in the construction of a trousers model just as well as in the construction of a breeches model. The whole of the construction of this model is evident from a mere view of it, as the student is now already acquainted with the construction of models for trousers and breeches, and for that reason it is not necessary to make any farther observation on the matter. But in comparing the *position* of the *knee part* in this model with that of the knee part in those for breeches, we see that it is in the present figure, 9, situated in the normal point M, whereas the knee part in breeches models recedes in a greater or lesser degree from this point, M. This is accounted for as follows; namely, the breeches are fastened tight on the knee of the figure, but not so the trousers, hence the former need greater length from the knee in the leg upwards, than the trousers require in this direction; then, to bring too much length in this part would cause the trousers here to be too full, which does not belong to their style, whereas in a breeches the style does demand such fulness.

The line A C B in fig. 9 does not belong to the model just described, but it is drawn if a sailor's trousers are meant to be constructed. In this case C M = 1 unit is added to L M. At the side line at N the two models in this figure (9) are nearly the same, having only the exception that the model for the sailor's is the same in the hind and forepart, as shown at D E; when by the servant's the front part is less than the hind part, as D F G presents.

A second model for a riding trousers is presented under fig. 10, which is different in style from the former kind given for that purpose. The normal points in this model, N, C, A, P, K, Q, as well as the pelvial axis G H, and the leg axis J K, are all the same as they have constantly been in the preceding trousers models. But here is added A B = 1½ to F A, and the curves B P and E P drawn; for this addition again C D = 1½ is taken from C N, and the curve D F P is drawn. The normal points C and A have lost their positions, which causes the shortening of the curve B P, and the lengthening of the curve D F P. Naturally the point N retains its position, because N T = U N. The undress side is made less by ½ unit = B E than the dress side.

The leg part of this model is very straight, as the point S shows, which lies just on the outside of the line of direction R Q. The normal points M and N of the size of the knee are here only put for the purpose of making it visible how much more straight the line P S O is than those corresponding ones in the other trousers model. K O = 3¼ is the same quantity as that in former models. As K T = Q K, Q T is equal to the width of the heel.

GAITER MODELS.

¶ 101.——The measure for a gaiter model is taken as follows:—First, is the length A B (see fig. 1, pl. 42); the second measure to be ascertained is the top size of the leg in the direction A; after this, the ankle size G C is taken; farther the size of the instep D C; then the measure of the projection D E; and lastly, the height of the instep C B, and E F the front size of the foot.

The line G C runs upon the ankle on the inner side of the foot, where in taking the measure it must be placed. This measure, if it is used in the construction of the model, must be prepared as A B equal to the entire ankle size presented under fig. 2, namely, A B is divided into 9 parts, and the part C B taken equal to one unit, by which the gaiter model is constructed. Although the models can be constructed by the prepared measure from the ankle, still the proportion measure A B, fig. 3, is most frequently taken for the purpose. As the latter measure is ready at hand, it answers just as well, provided the model is not of a very small or of a very large size; as, for instance, when meant for a boy, or for a very Herculean form of man; in these extreme cases, the prepared ankle measure is the best by which to construct, because in neither of the two cases does the size of the ankle keep in a fixed ratio with the breast (thoracial) circumference. Here, in this measure, fig. 2, the units are equal to those of the measure fig. 3; and so it would be in all cases of the middle forms (proportionate forms of the human figure) of whatever size they may otherwise be.

The model, fig. 4, is that of a groom's gaiter, to which belongs the tongue part, fig. 5. The mode of constructing this model needs not any explanation, as the co-ordinates are all under right angles, accompanied by the proportion numbers. However it may be remarked, that A B is equal to the length of the measure taken from the length of the leg. It may be farther observed, that the instep measure is applied from the point C out towards A, and it most frequently happens that this measure is equal to C A; whether it is shorter or longer, then a mark is made in the region of A, and so much taken off or added on to the model accordingly. In the same manner is applied the top size of the measure from E, out towards B, and taken off or added in B, according as indicated by the measure. From the marked point out, now A, the projection measure of the foot is placed, and led towards D, which will indicate if the tongue part projects sufficiently in the front upon the foot. That the line A B of the tongue is inserted in the line D F of the gaiter part, is quite evident without further explanation. It is equally clear also, that a second part E B A G, must be copied from the gaiter part, whereon the buttons are put as the diminutive circles indicate.

From this explanation it is already evident how we must proceed with the rest of the gaiter models presented on this plate. But it may be added also to what style each model belongs. The fig. 4, just described, is that of an English servant's style; whereas the other, fig. 6, pl. 42, is that of a German servant's. To the latter belongs the tongue, fig. 7; it is folded together in A B, and lies double, stretched out in the curve A B, at which part it is inserted in the opening A B of the fig. 6.

The small model, fig. 8, is termed the short sporting style, and the gaiter made of leather. It is constructed by the small scale drawn beneath it. The tongue C A B is at a right angle with A; and as B C is one quarter of a circle, B D = D C; therefore if C is folded over to B, then A D makes the middle of the tongue upon the foot.

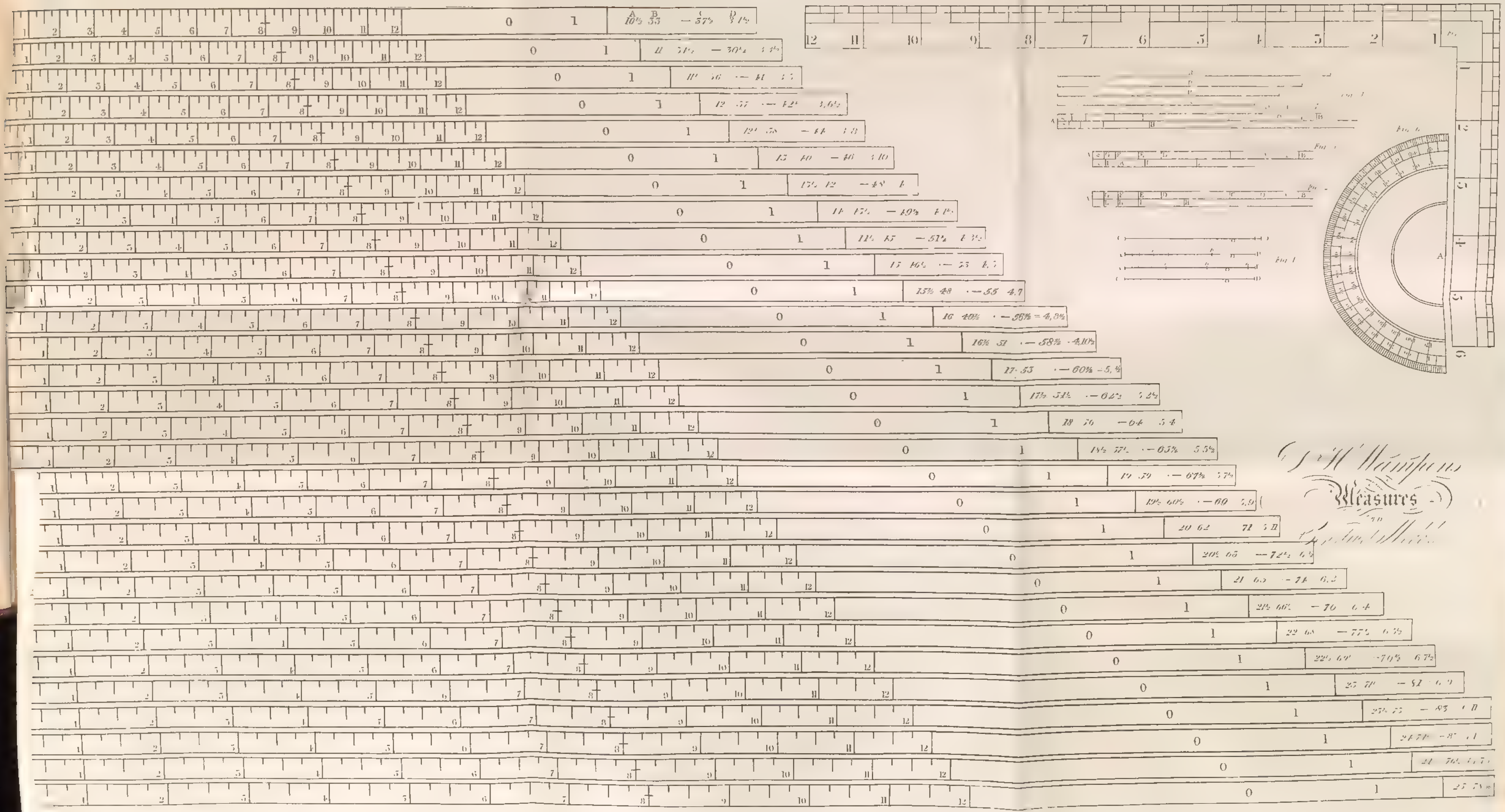
The model fig. 9, pl. 42, is that of a French style worn by gentlemen, to which belongs the tongue part, fig. 10. This tongue has a seam in A B, running through the middle on the front of the foot. It is inserted at C D in the opening of the gaiter part A B, fig. 9. The length A B of the tongue, fig. 10, is not meant to be fixed, but optional, as it can be made of a greater or less length at pleasure.

There is another style of model presented under fig. 11, pl. 42, which is termed the shoemaker's style, very generally worn by gentlemen. The small flap A B falls over from the middle of the foot, up in front to the outside of it, and is blind buttoned. This gaiter is laced on the inside of the leg; or as now gutta percha is in use, instead of lacing, a strong band of that material is preferred.

There is still another gaiter model given under fig. 12, pl. 42, termed a ladies' style of gaiter, and indeed it is the only one in which ladies have them made. It has a peculiarity of form, which the model here shows, and is the only one corresponding to the form of a lady's foot. This form has a seam in the front on the foot in A B, and is laced on the inside of the foot, C D. Here the tongue and ankle part are constructed in one. It will be immediately seen that the model presents to view only the half, the opposite half being equal in size and form.

Having ended with the gaiter models, there is still another object to consider before leaving this plate, namely, the model, fig. 13, of a long legging, going up to the trunk of the figure. The short legging does not extend higher than the knee, and is there constructed as a groom's gaiter model, without a tongue, buttoned up straight on the outside of the leg.

It may be mentioned, in conclusion, that the models correspond to the part of the leg presented under fig. 1, with the exception of the one at fig. 8, which is of a smaller size than the rest of the models. The line A B in fig. 9 may very easily be perceived to be equal to the length of the curve C B in fig. 1. The student may consider whether it would not be advantageous to study the proportions of the real figure in nature, and those also of pieces of art; and after this, by comparing the proportions with each other, endeavour to find those parts in which the real figure is equal to the figure produced by art, and those also wherein they differ. It may be agreeable to know such, as almost directly belonging to the part upon constructing models for draping the human figure; and further, such knowledge may be serviceable in designing a beautiful costume to the figure. Even should this not be considered as needful, then certainly it is so to draw some part of the human figure, to make perfectly distinct that part of the model for its drapery, in a manner similar to that which here presents the foot and leg together with the gaiter models.

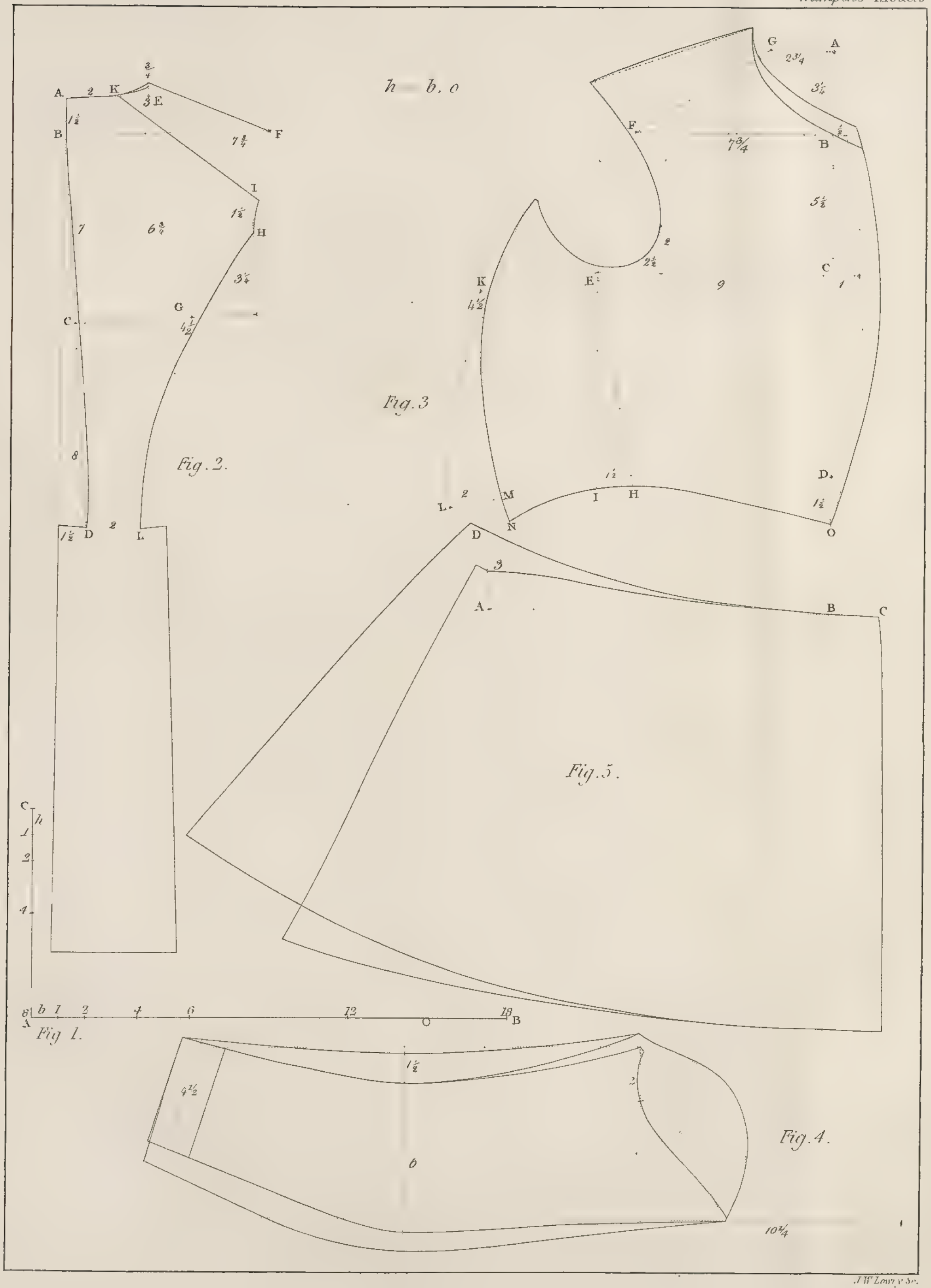


Dr H Wampen's

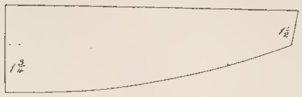
Measures

for

[illegible]


h — b. o
A 2 K ¾ ⅜ E
1½ 7¾ F
B
I
7 6¾ 1½
H
3¼
C G 4½
8
Fig. 2.
1½ D 2 L
C h 1 2 4
a b 1 2 4 6 12 o 18
A B
Fig 1.
G A 2¾
3¼
F 7¾ B ½
5½
2 2½
K E C 1
4½ 9
Fig. 3
1½ D
L 2 M I H 1½
N O
D 3
A B C
Fig. 5.
1½
4½ 2
6
Fig. 4.
10¼

J.W. Lowry Sc.



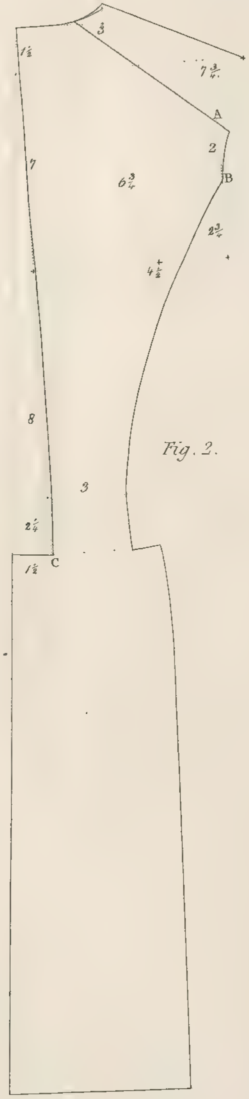


Fig. 2.

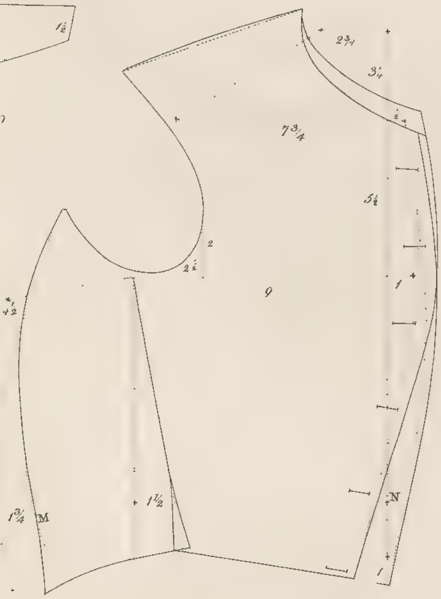


Fig. 3.

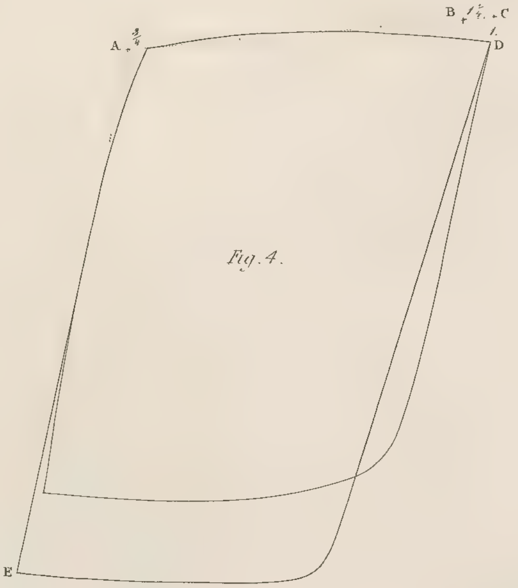


Fig. 4.

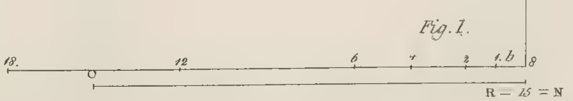
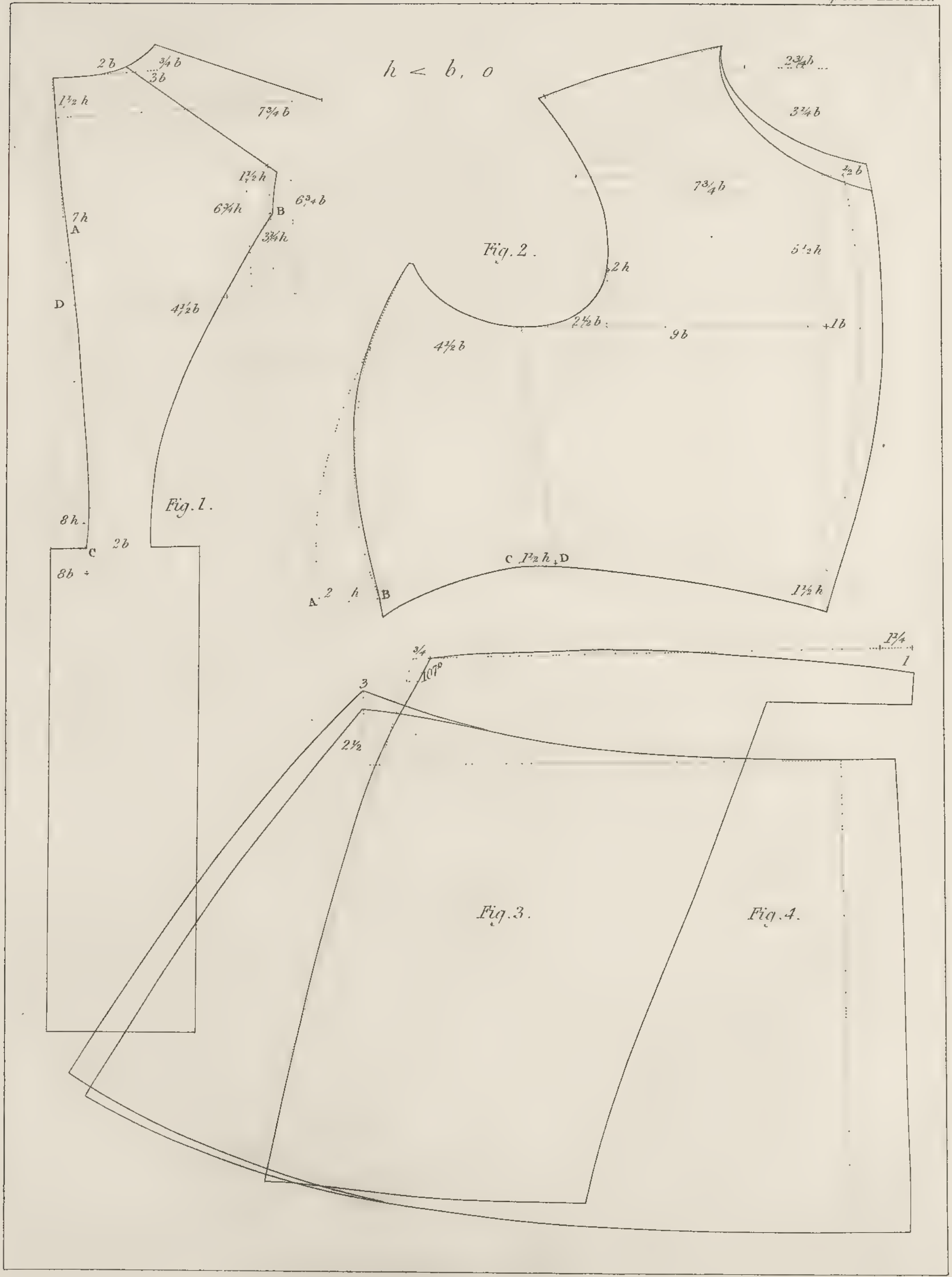
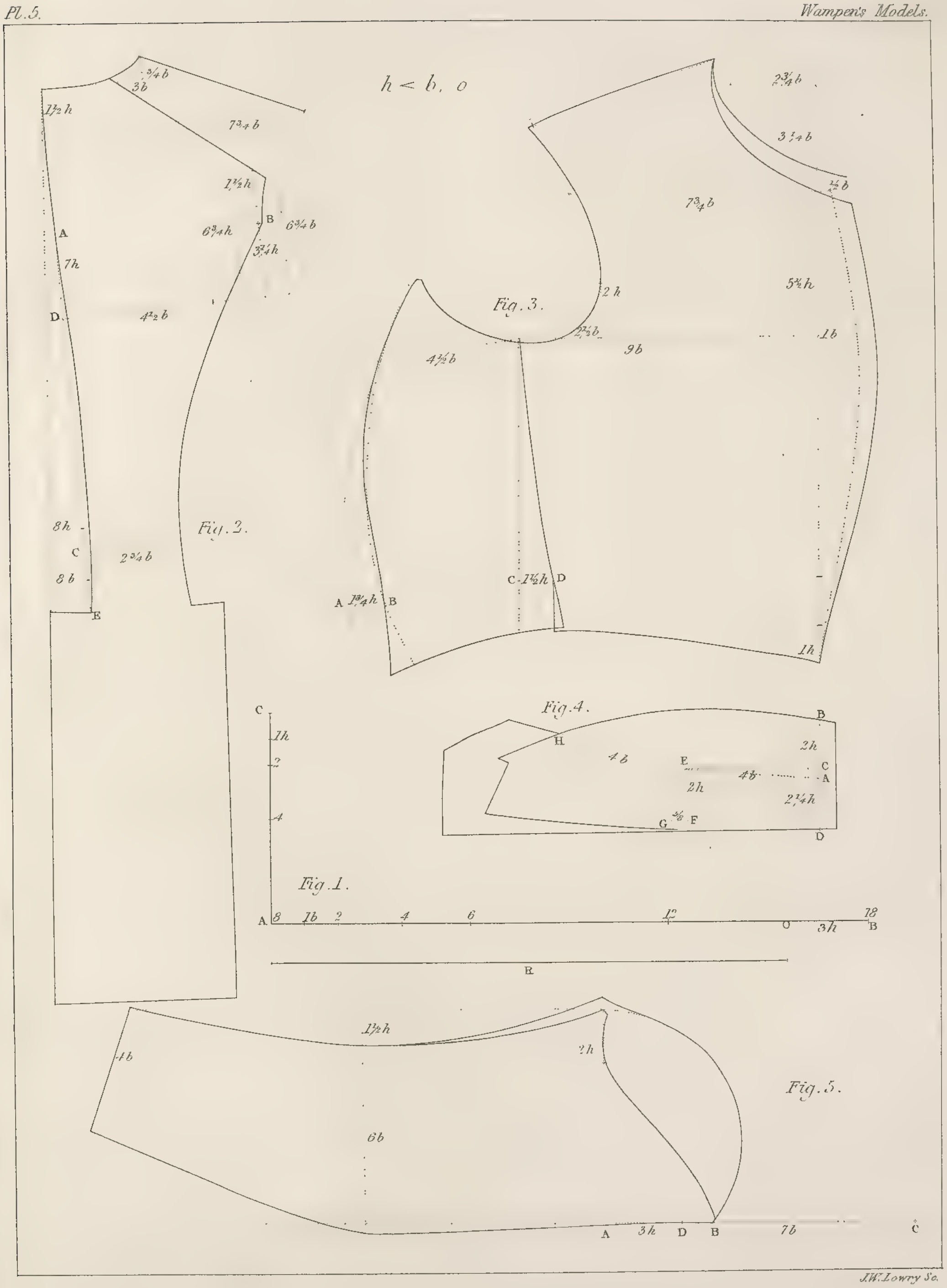


Fig. 1.

J W Lowry Sc.


h < b, o
2 b
¾ b
3 b
1½ h
7¾ b
1½ h
6¾ h
B
6¾ b
3¾ h
7 h
A
D
4½ b
8 h
C
2 b
8 b
Fig. 1.
2¾ b
3¼ b
½ b
7¾ h
Fig. 2.
5½ h
2 h
2½ b
9 b
1 b
4½ b
C 1½ h D
A 2 h B
1½ h
¾
107°
1¾
1
3
2½
Fig. 3.
Fig. 4.


h < b. o
¾ b
3b
7¾ b
1½ h
1½ h
B
6¾ h
6¾ b
3¼ h
A
7h
D.
4½ b
Fig. 2.
8h
C
2¾ b
8 b
E
2¾ b
3¼ b
½ b
7¾ b
5½ h
2 h
Fig. 3.
2½ b
9b
1b
4½ b
C 1½ h D
A 1¾ h B
1h
Fig. 4.
B
H
4 b
E
2h
4b
C
A
2h
2¼ h
G ⅜ F
D
C
1h
2
4
Fig. 1.
A 8 1b 2 4 6 12 18
O 3h B
E
1½ h
4 b
2h
Fig. 5.
6b
A 3h D B 7b C

J.W. Lowry Sc.

$h > b, o$

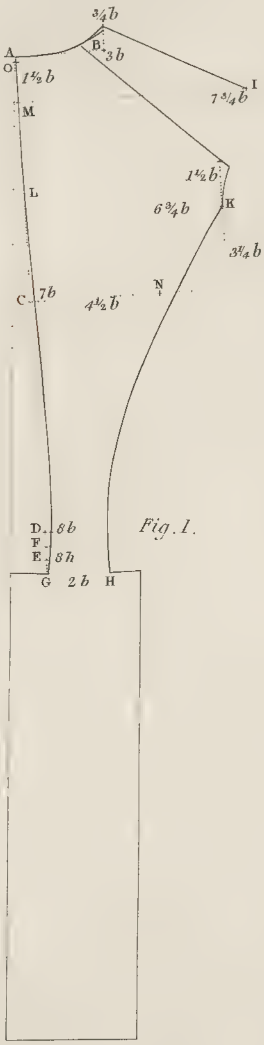


Fig. 1.

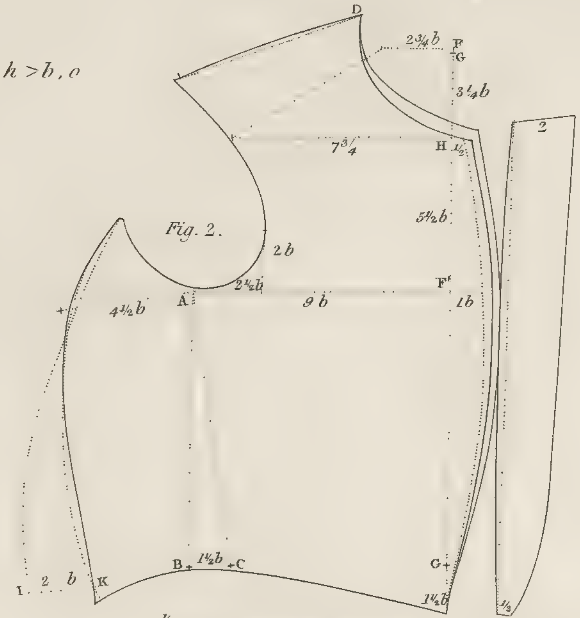


Fig. 2.

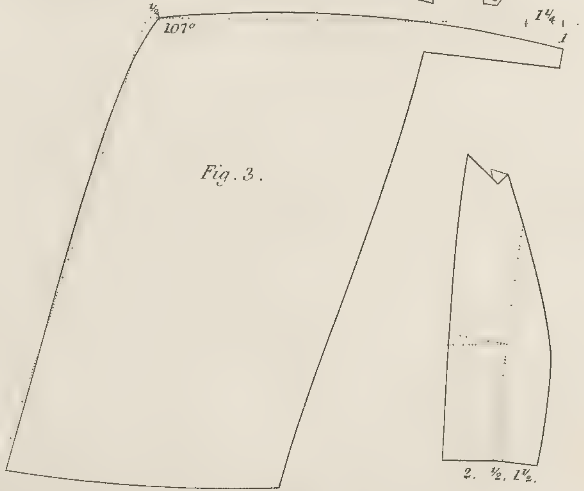


Fig. 3.

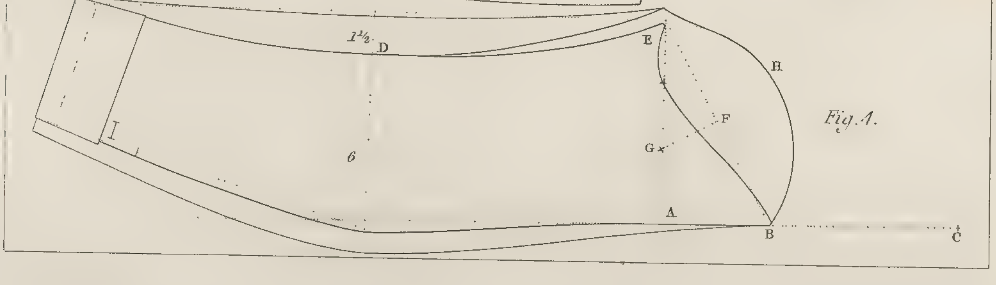


Fig. 4.

h > b, o.

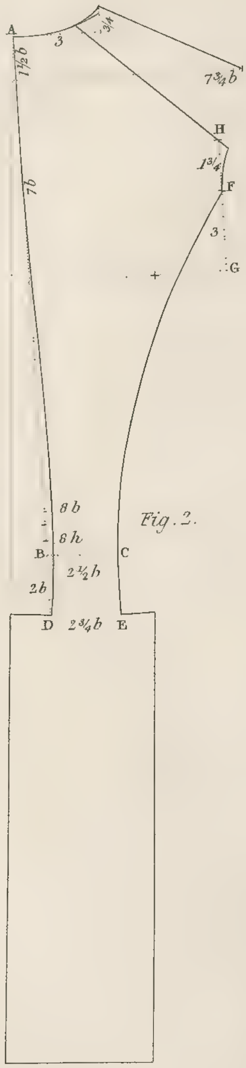


Fig. 2.

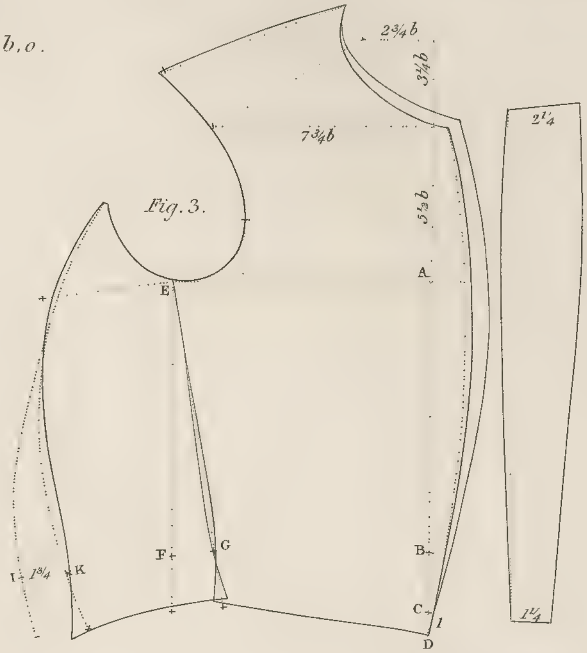


Fig. 3.

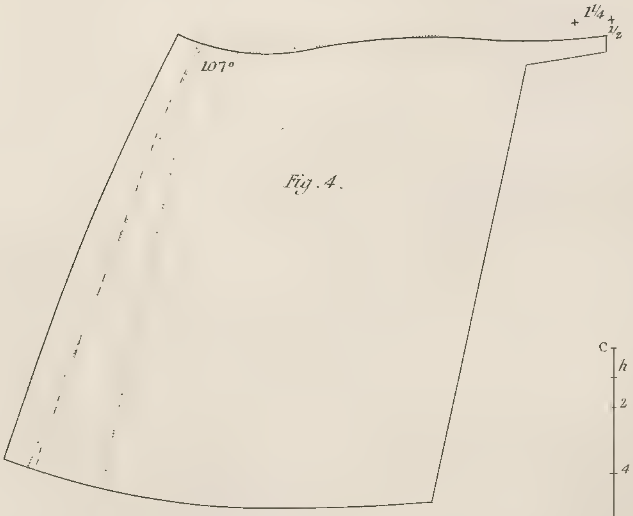


Fig. 4.

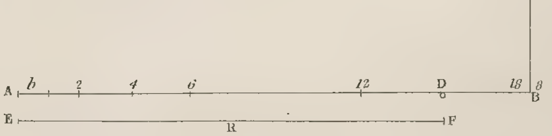
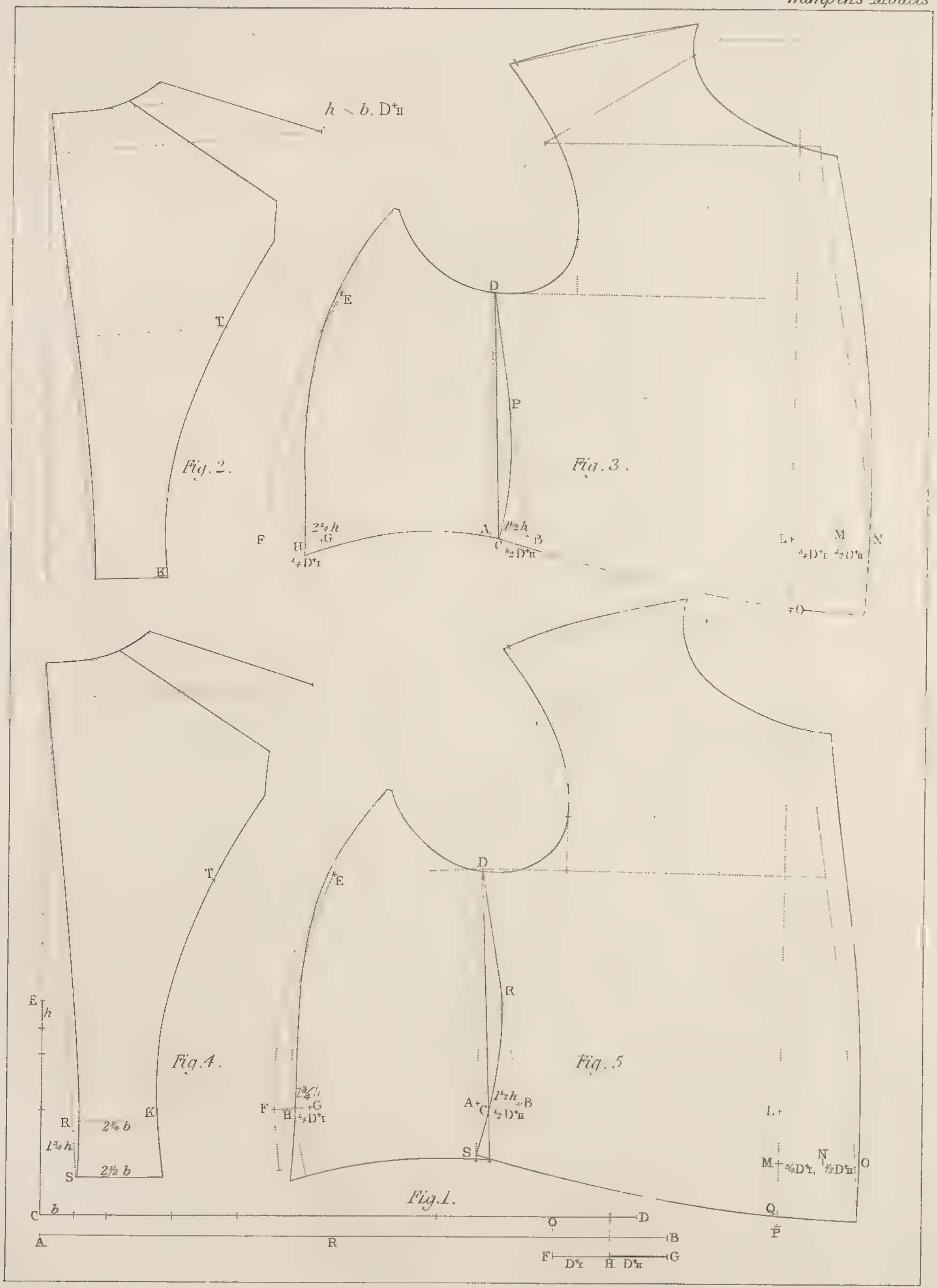


Fig. 1.

J. W. Lowry fc.


h ~ b. D+II
T
Fig. 2.
K
E
D
P
Fig. 3.
F
H
2¼ h
G
¼ D+I
A
1½ h
B
C
½ D+II
L
M
N
¾ D+I
½ D+II
O
T
E
D
R
Fig. 4.
Fig. 5
E
h
R
K
2¾ b
1¾ h
S
2½ b
1¾ h
F
G
H
¼ D+I
A
C
1½ h
B
½ D+II
S
L
M
¾ D+I,
N
⅓ D+II
O
Q
P
Fig. 1.
C
b
O
D
A
R
B
F
D+I
H
D+II
G

J. W. Lowry, fc

$h < b.\ D^{+}_{1}$

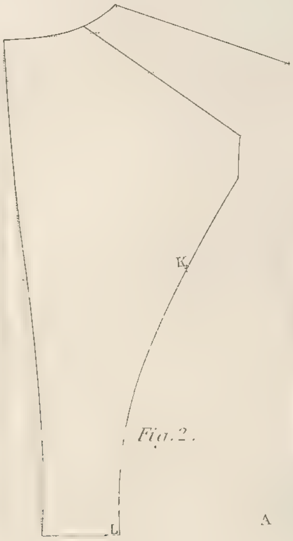


Fig. 2.

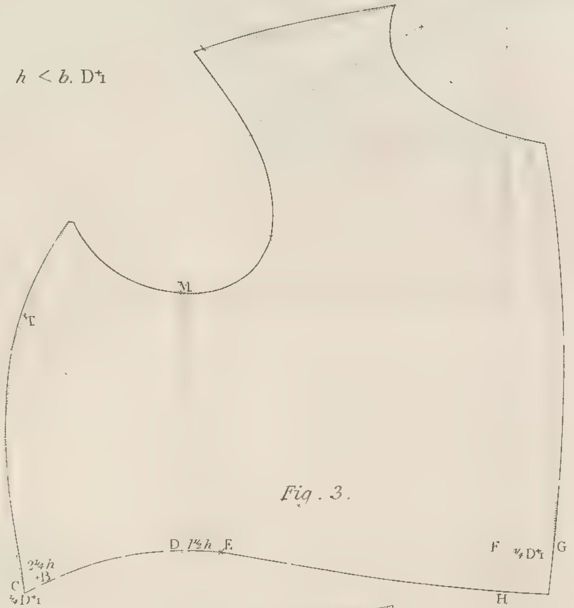


Fig. 3.

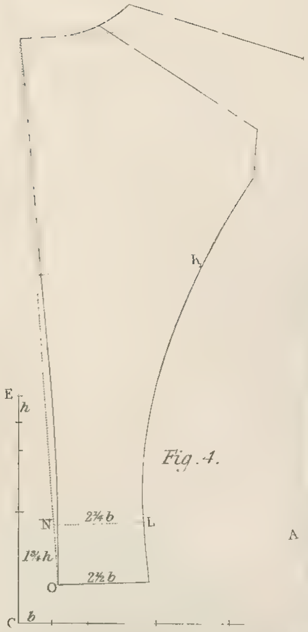


Fig. 4.

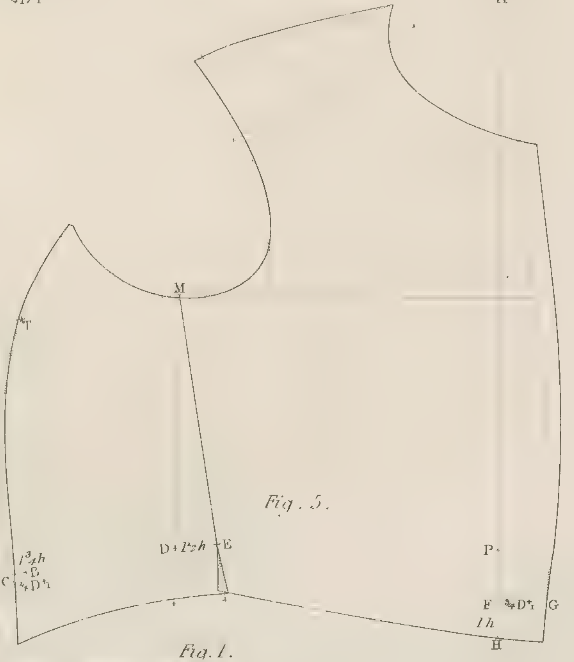


Fig. 5.

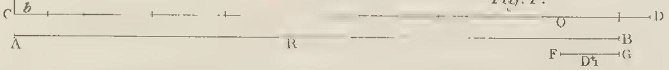


Fig. 1.

J W Lowry, fc

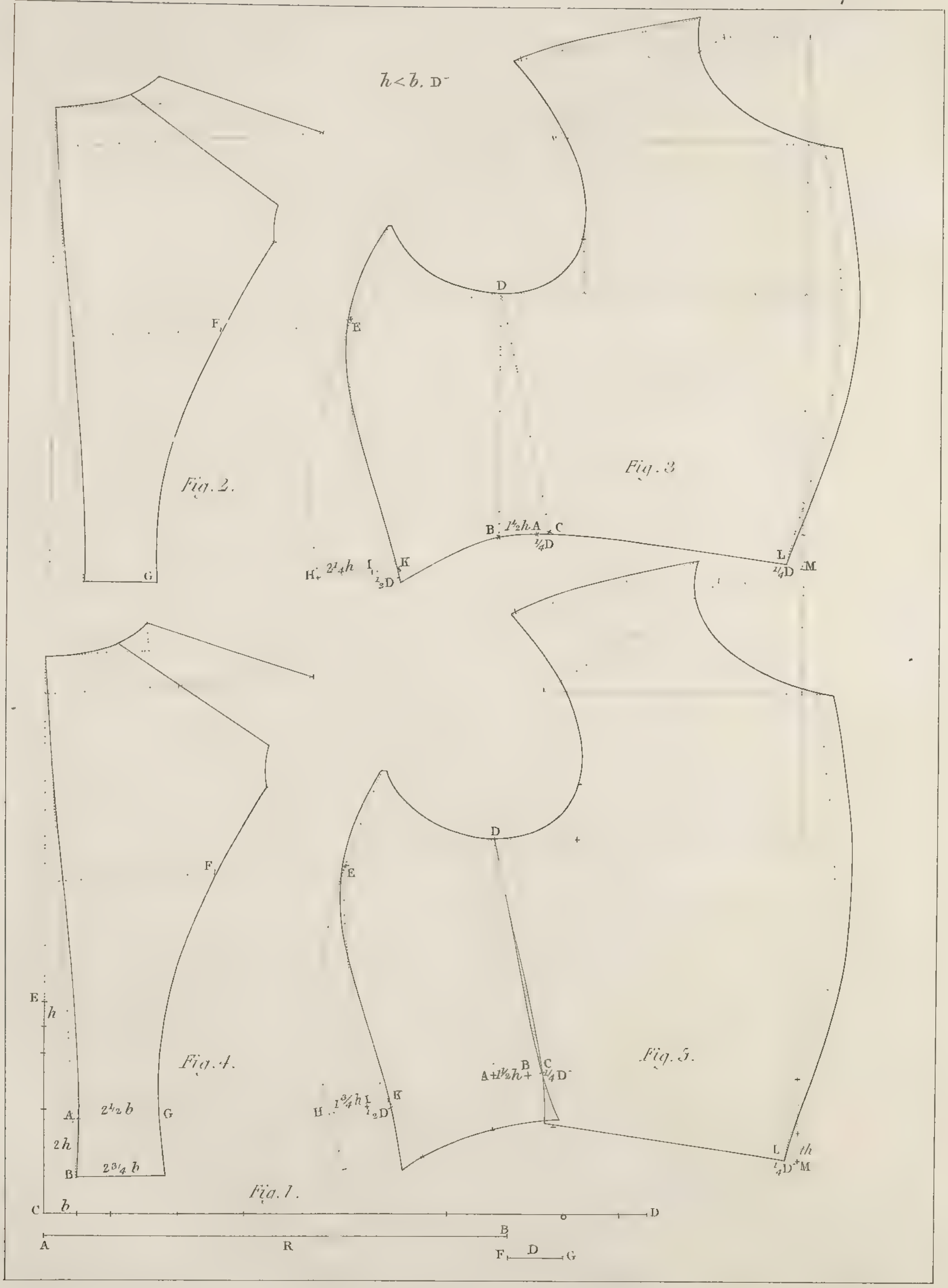


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 1.

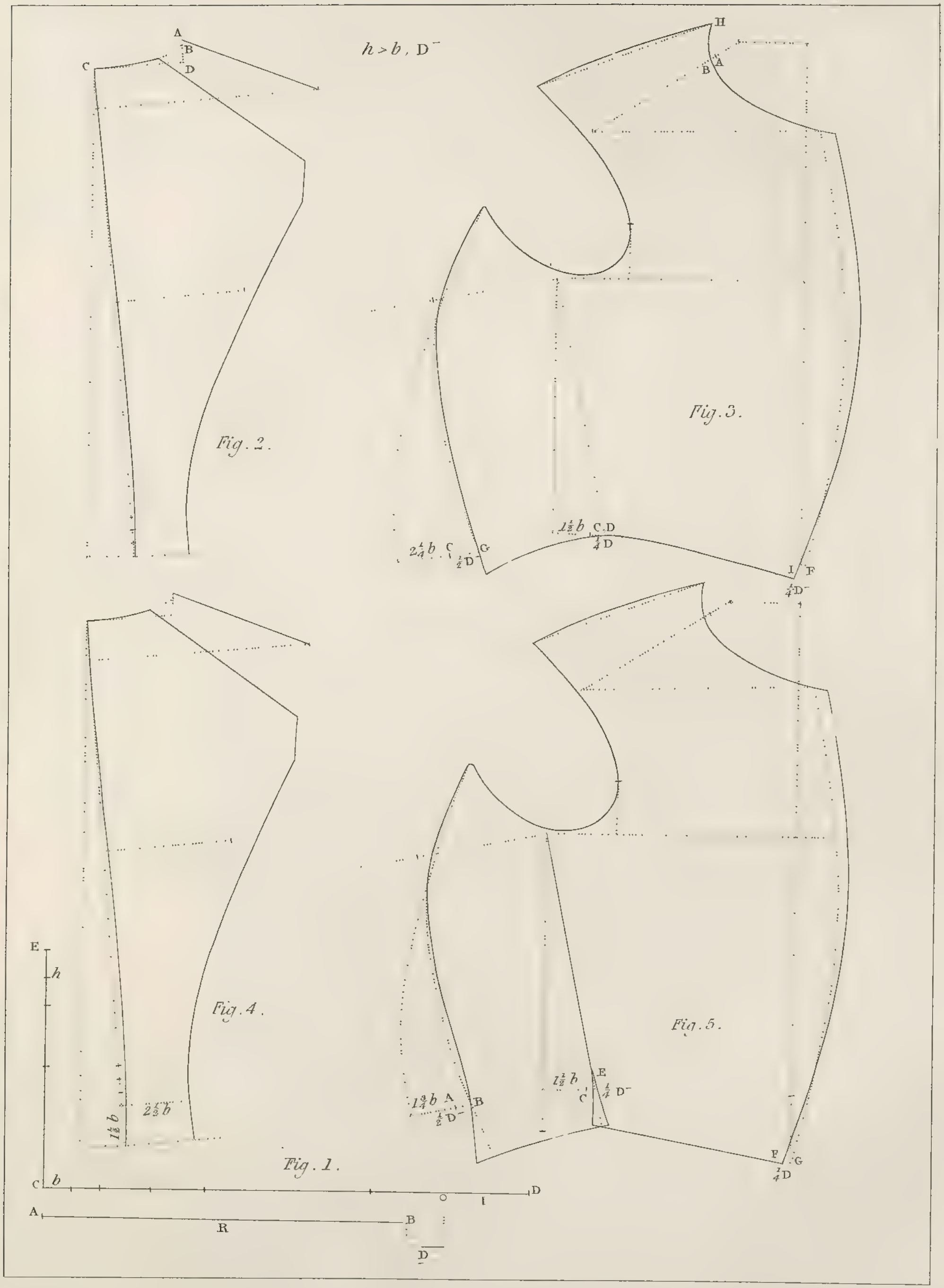


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 1.

J.W. Lowry fc.

Pl. 12.

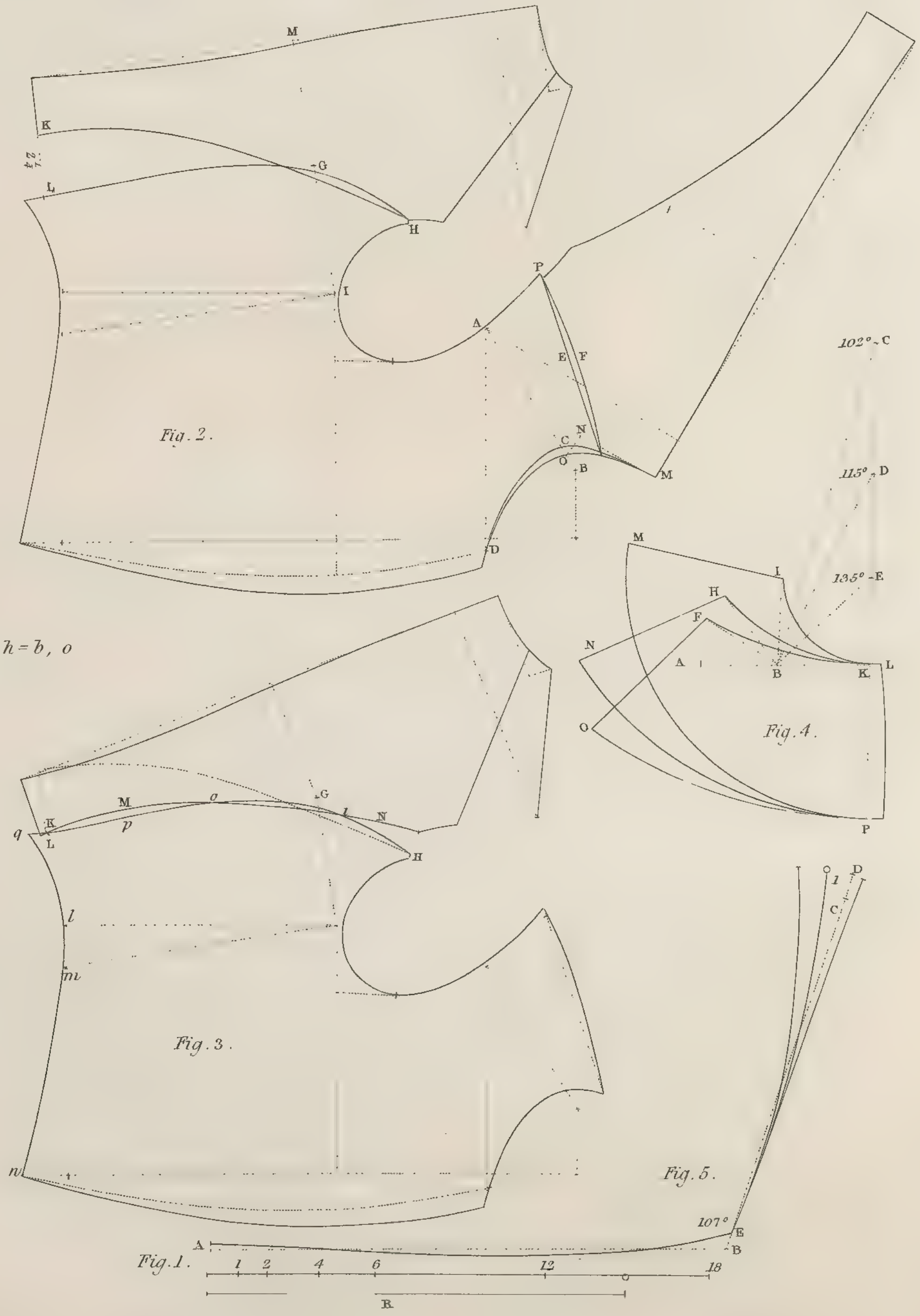


Fig. 2.

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 1.

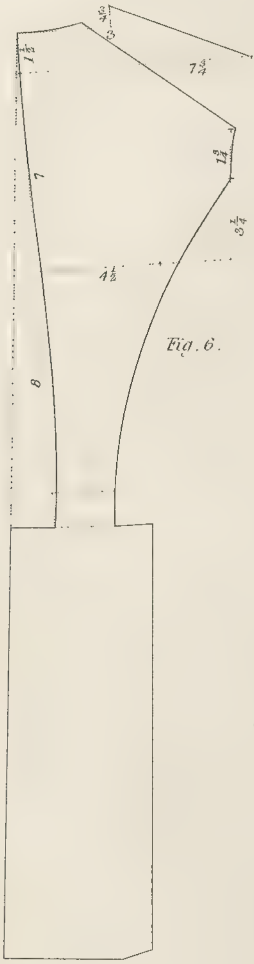


Fig. 6.

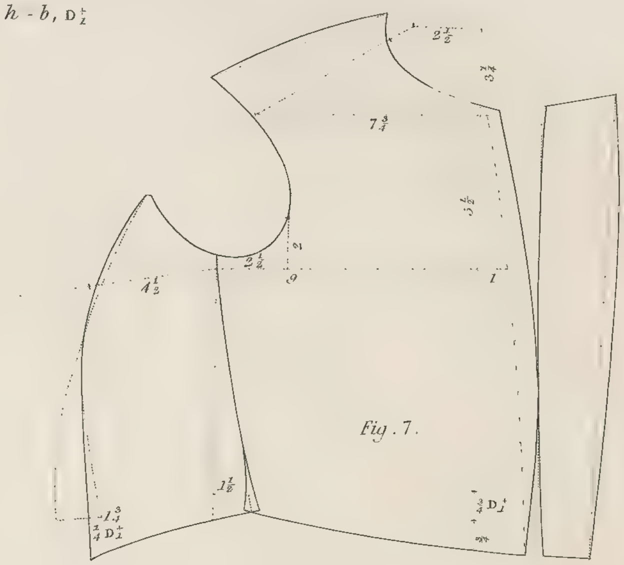


Fig. 7.

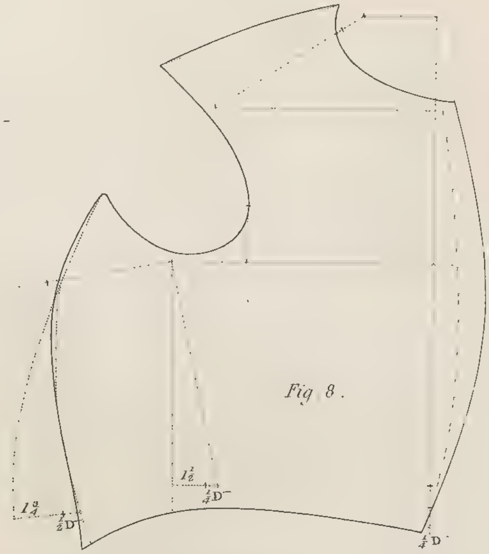


Fig. 8.

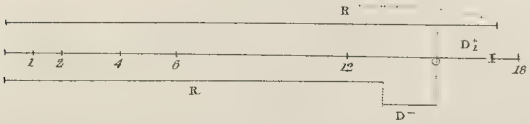


Fig. 9.

J. W. Lowry fc.

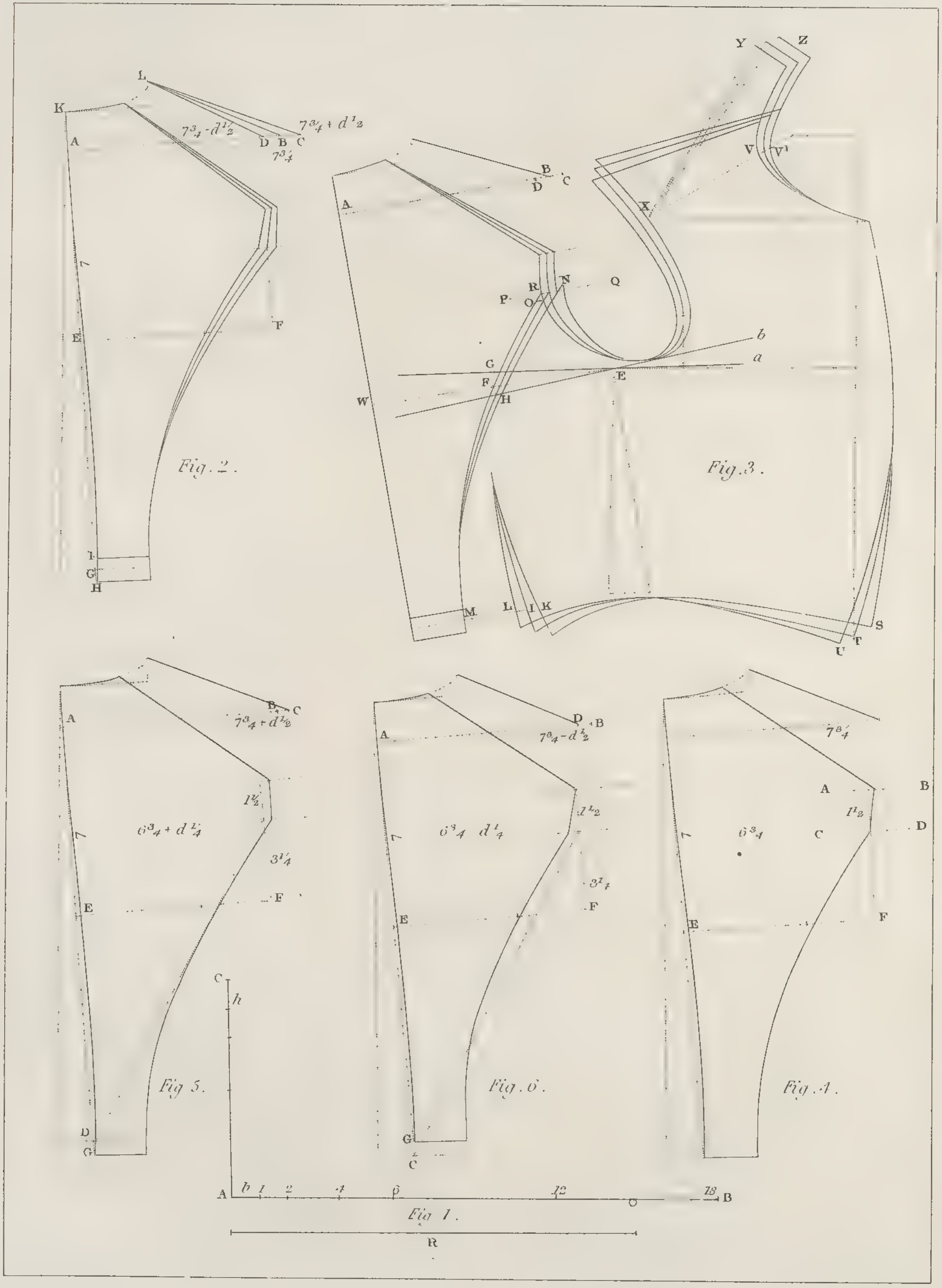


Fig. 2.
K
L
A
$7^3{}_4 - d^1{}_2$
$7^3{}_4 + d^1{}_2$
D B C
$7^3{}_4$
7
E
F
I
G
H
Fig. 3.
Y
Z
V
V'
X
A
B
D
C
P
R
N
Q
O
b
a
G
E
F
H
W
M
L
I
K
S
U
T
Fig 5.
A
B
C
$7^3{}_4 + d^1{}_2$
$1^1{}_2$
$6^3{}_4 + d^1{}_4$
7
$3^1{}_4$
E
F
D
G
Fig. 6.
A
D
B
$7^3{}_4 - d^1{}_2$
$d^1{}_2$
$6^3{}_4\ d^1{}_4$
7
$3^1{}_4$
E
F
G
C
Fig. 4.
$7^3{}_4$
A
B
$1^1{}_2$
D
7
$6^3{}_4$
C
E
F
Fig 1.
C
h
A
b
1
2
4
6
12
O
18
B
R

J.W. Lowry fc.

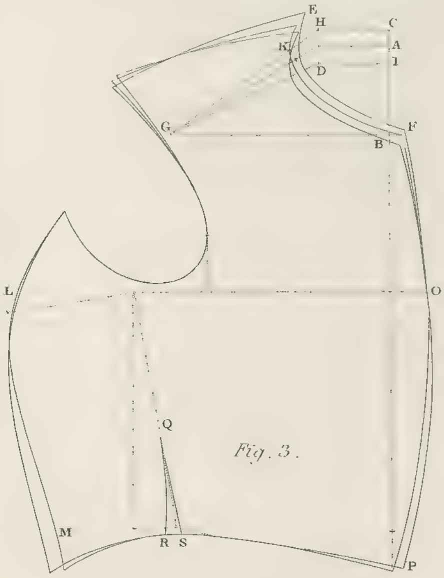


Fig. 3.

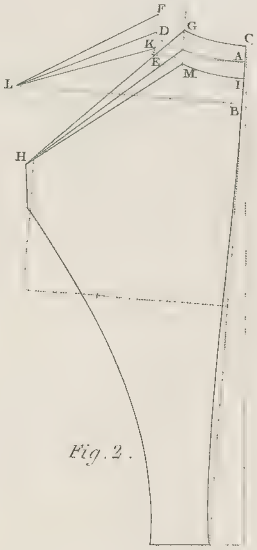


Fig. 2.

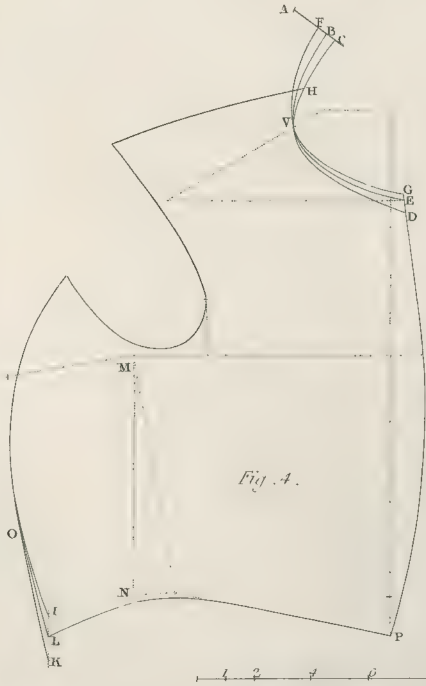


Fig. 4.

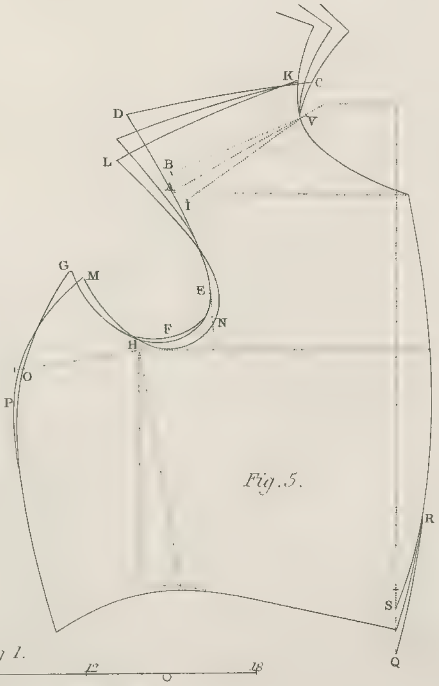
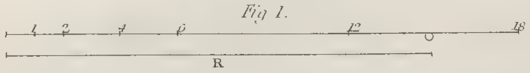


Fig. 5.

Fig 1.



J.W. Lowry fc

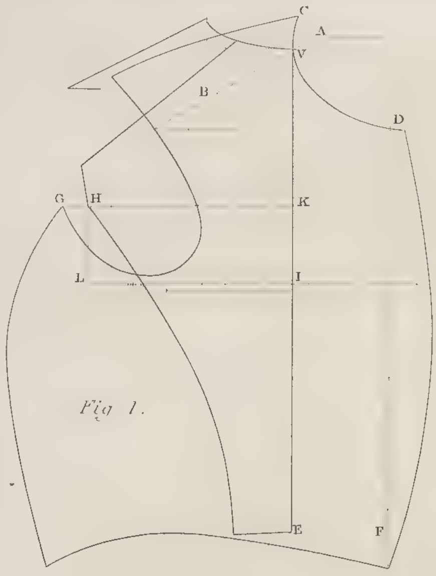


Fig 1.

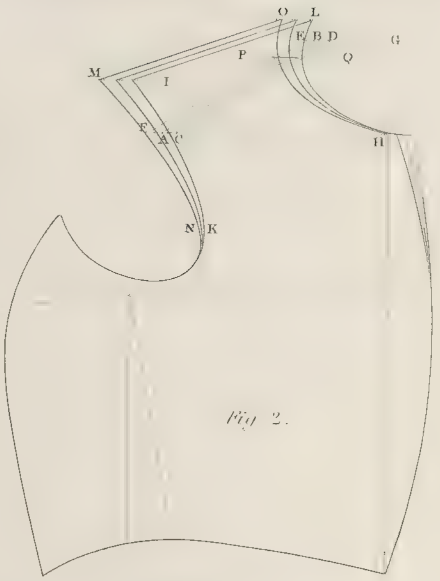


Fig 2.

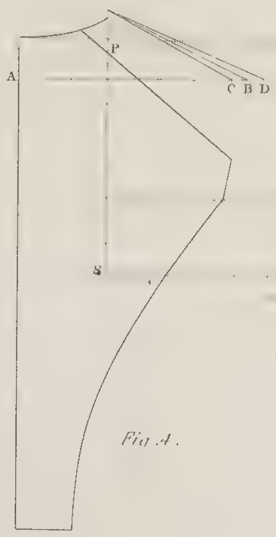


Fig 4.

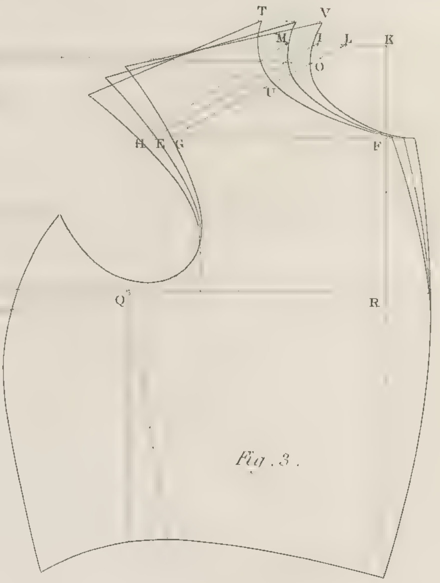


Fig. 3.

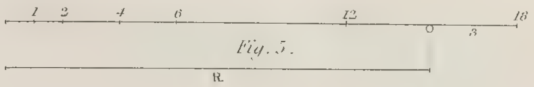


Fig. 5.

J. W. Lowry fc

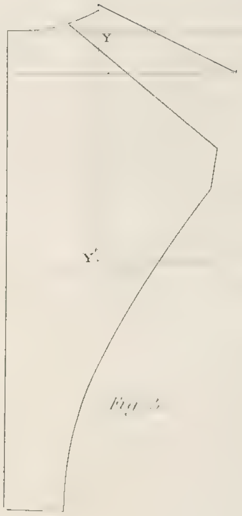


Fig. 2.

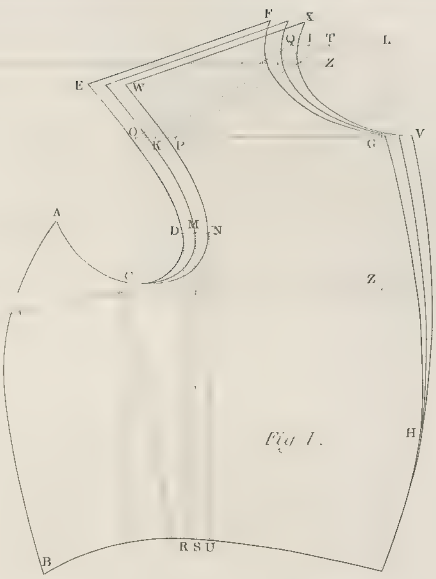


Fig. 1.

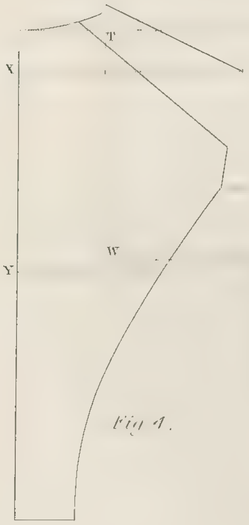


Fig. 4.

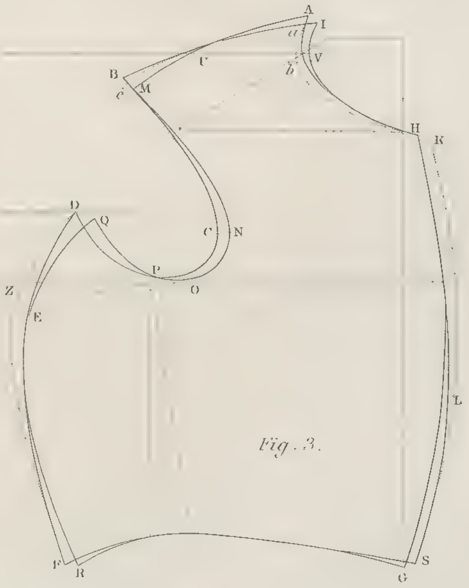


Fig. 3.

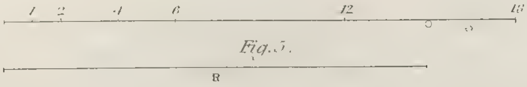


Fig. 5.

J.W. Lowry fc

Pl. 17.

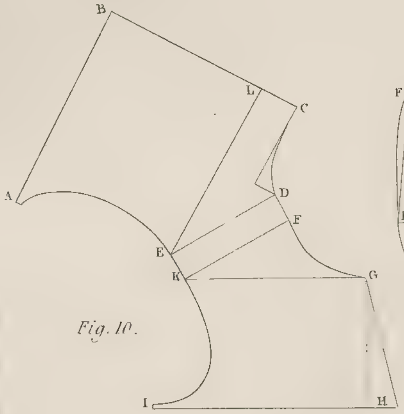


Fig. 10.

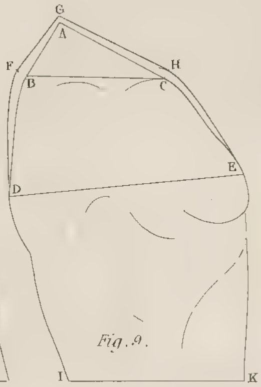


Fig. 9.

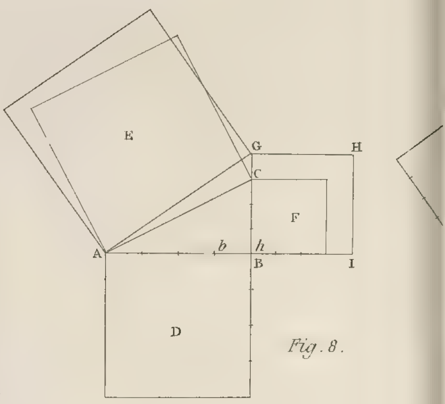


Fig. 8.

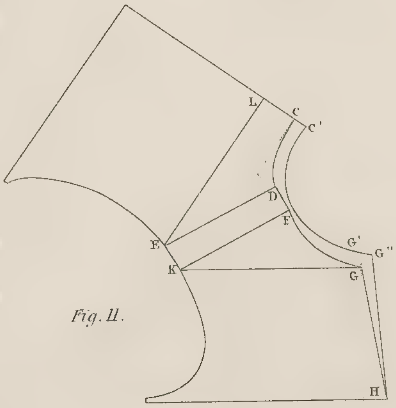


Fig. 11.

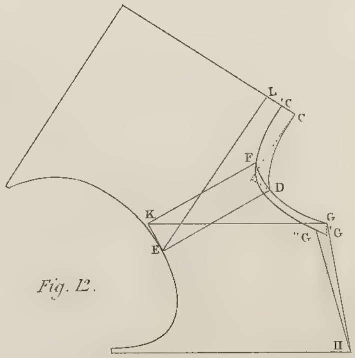


Fig. 12.

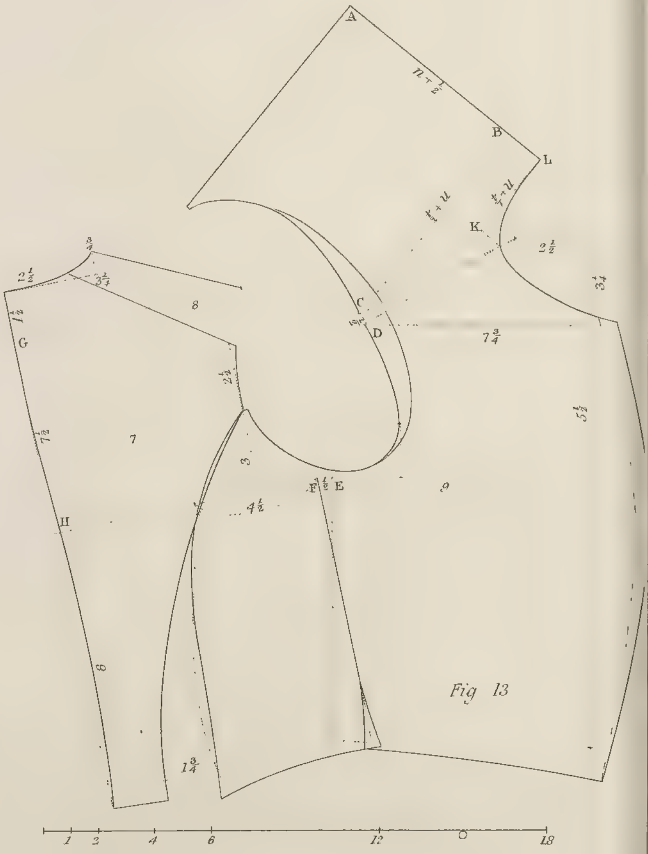


Fig 13

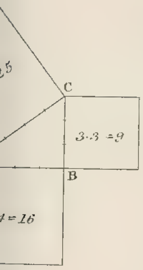


Fig. 7.

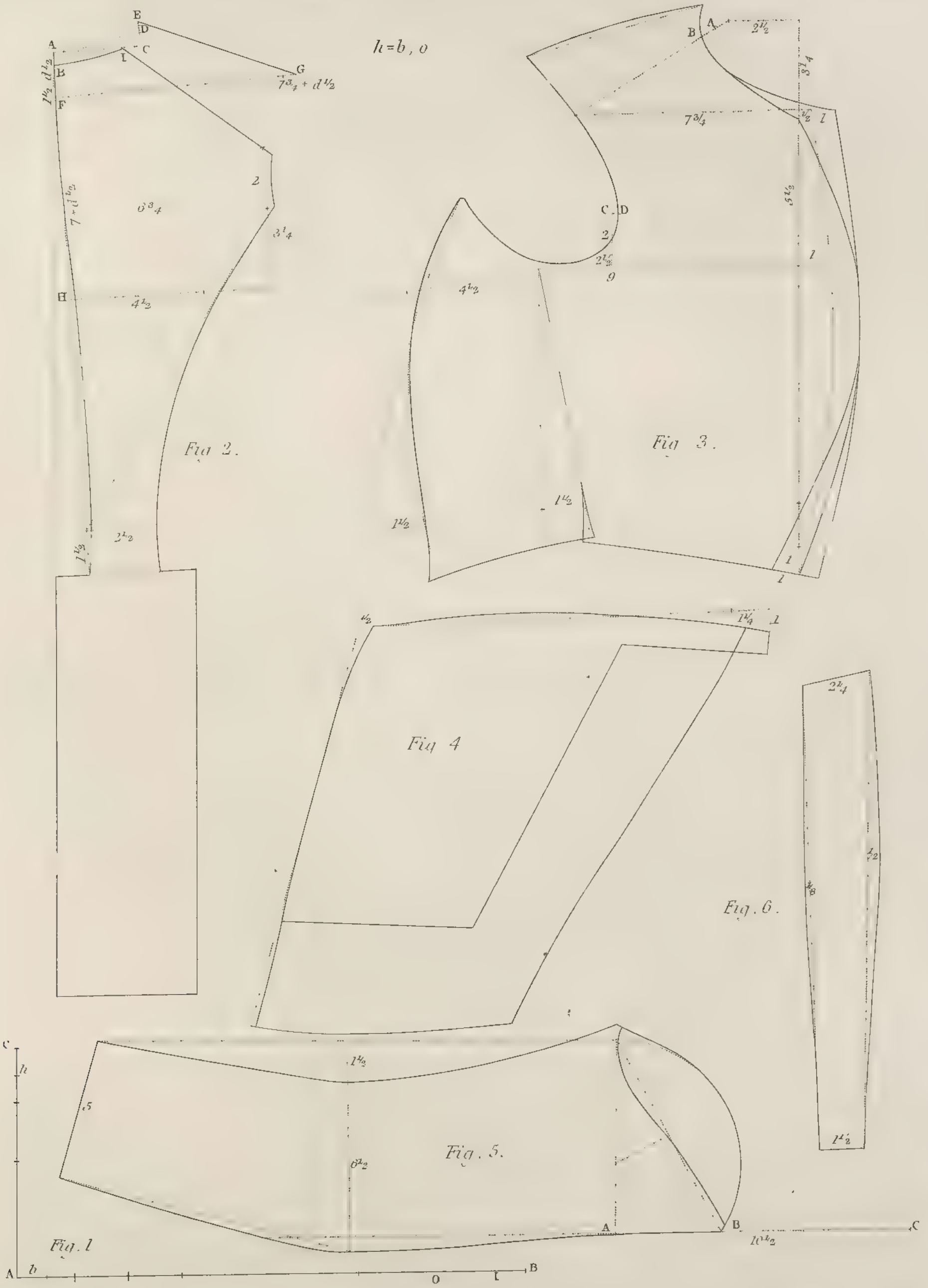


Fig. 2.

Fig. 3.

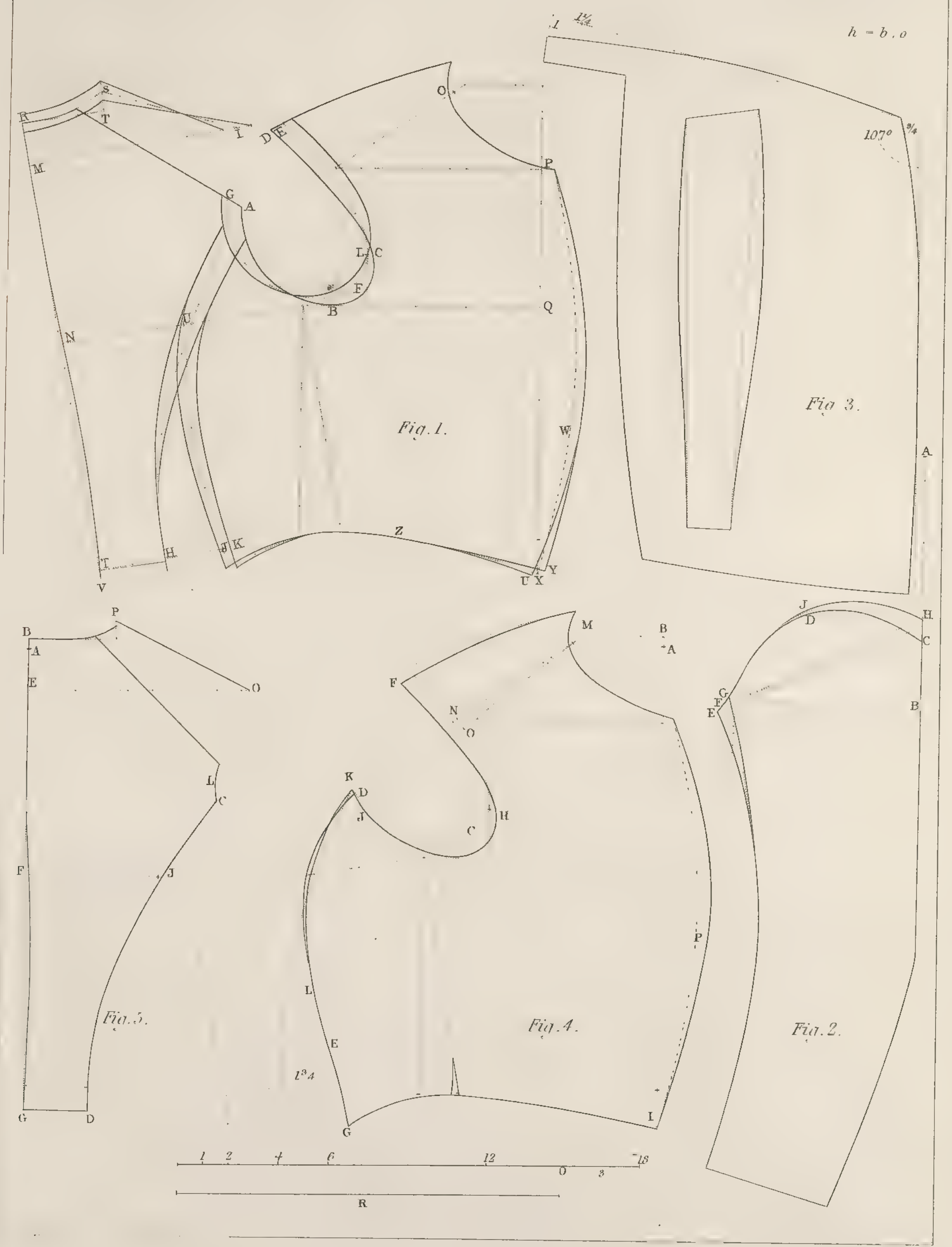
Fig. 4

Fig. 6.

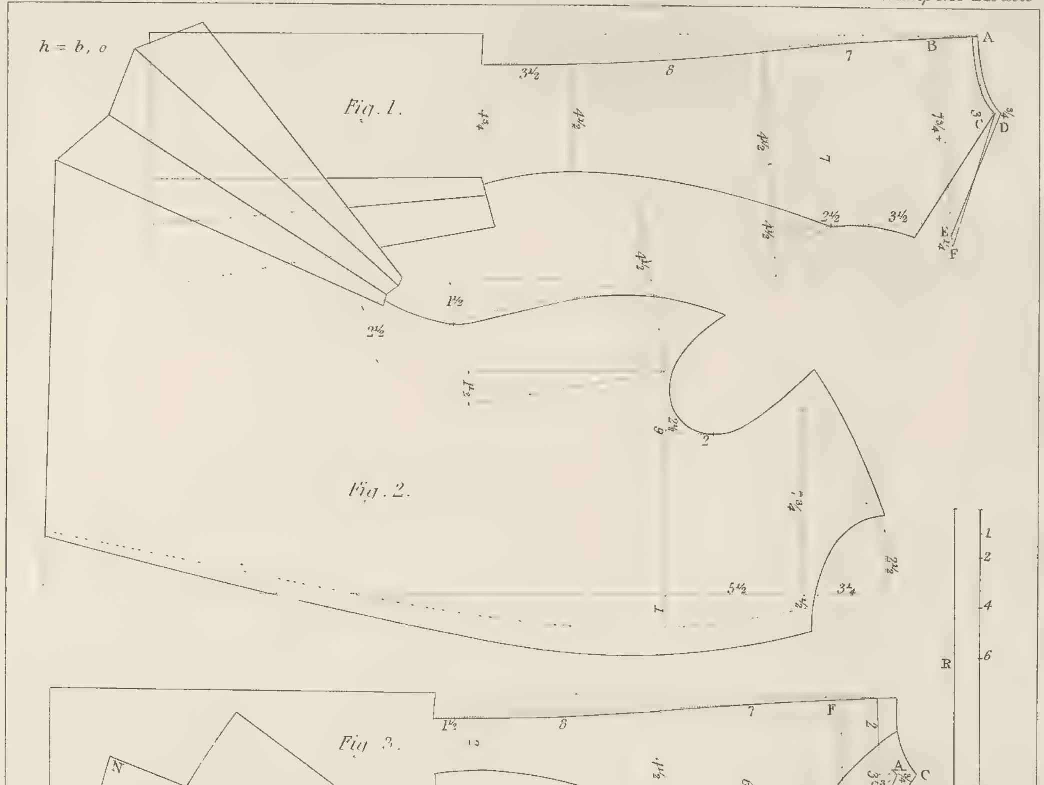
Fig. 5.

Fig. 1

J.W. Lowry fc


1 1¼
h = b . o
107°
¾
Fig. 3.
A
S
R
T
I
D
E
O
P
M
G
A
L
C
F
B
Q
U
N
Fig. 1.
W
Z
T
H
J
K
V
U
X
Y
B
A
P
E
O
L
C
J
F
Fig. 5.
G
D
M
B
A
F
N
O
K
D
J
H
C
P
L
E
1¾
Fig. 4.
G
I
J
H
D
C
G
F
E
B
Fig. 2.
1
2
4
6
12
18
0
3
R

J. W. Lowry, Sc.


h = b, o
Fig. 1.
A
B
C
D
E
F
7
8
3½
4¾
4½
7¾
2½
3½
Fig. 2.
1½
2½
6
2
7¾
2¼
3¼
5½
Fig. 3.
F
7
8
1½
6¼
A
C
G
E
A
B
D
B
7¾
3¼
R
1
2
4
6
12
0
3
18
Fig. 4.
N
M
G
K
L
H
J
O
D
F
E
C
C
D
4½
7¾
5½
3¼
2¼
6

J.W Lowry, Sc

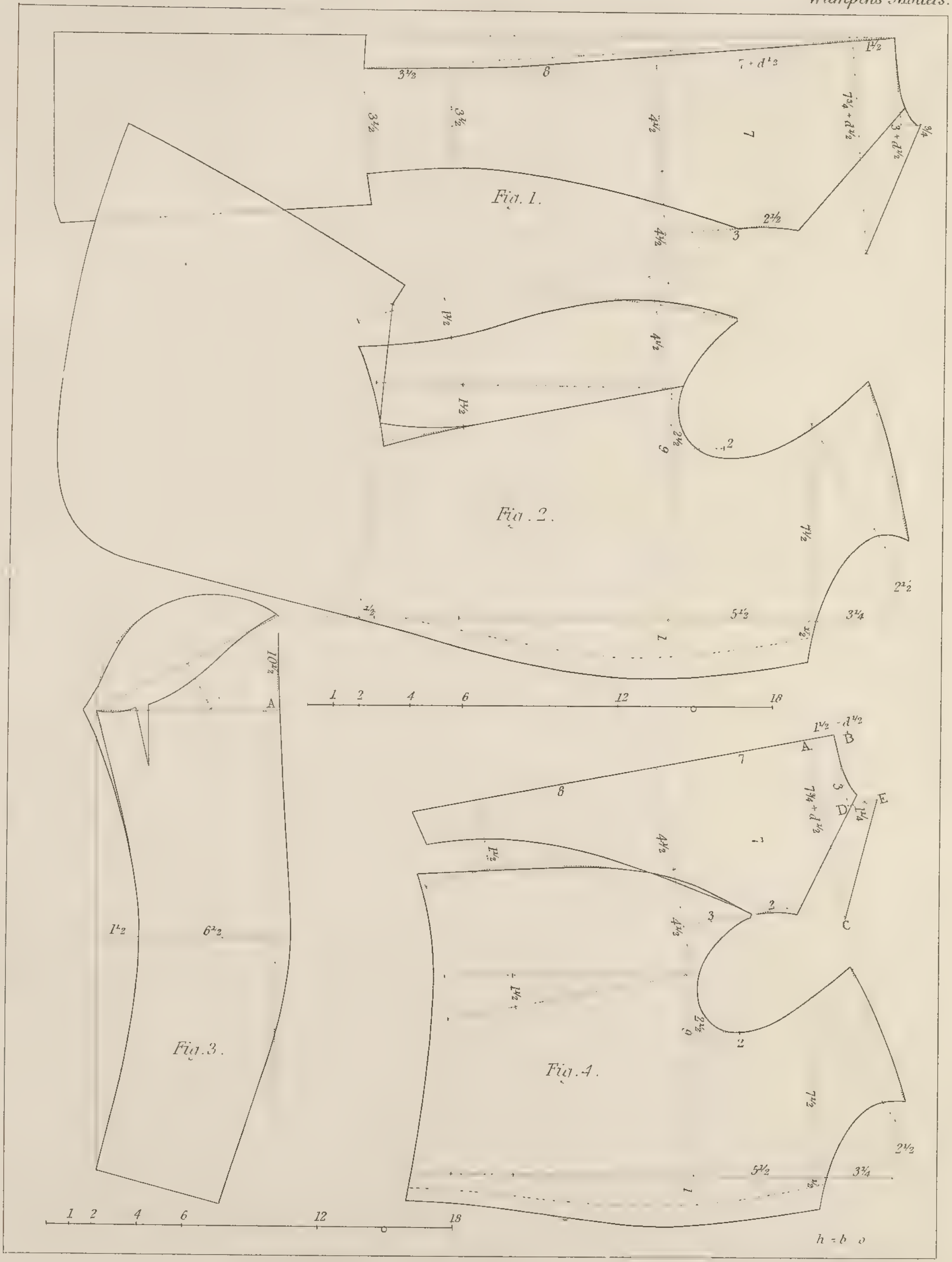


Fig. 1.
3½
8
7 + d½
1½
3½
3½
4½
7
7¾ + d½
3 + d½
¾
4½
2½
3
Fig. 2.
1½
4½
1½
9
2½
2
7½
2½
3¼
5½
½
7
½
Fig. 3.
10½
A
1½
6½
1
2
4
6
12
18
1½ - d½
B
A
7
8
3
D
E
1¼
7¾ + d½
4½
1½
3
2
C
4½
1½
9
2½
2
Fig. 4.
7½
2½
3¼
5½
½
1
h = b

J W Lowry. Sc

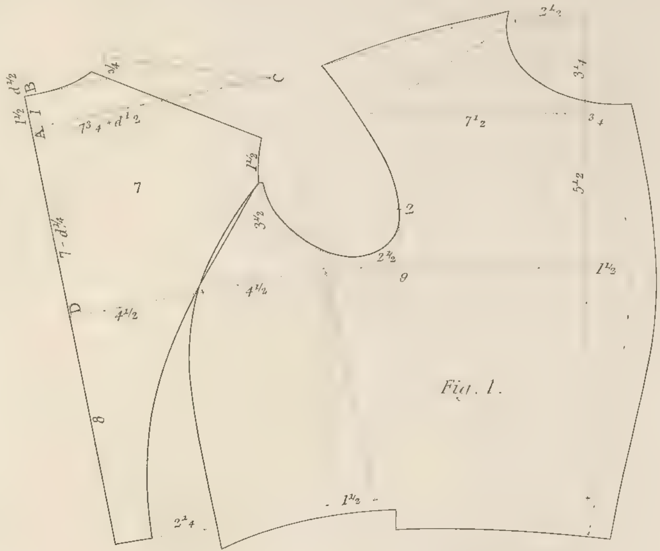


Fig. 1.

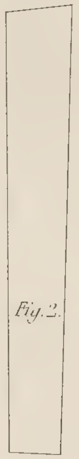


Fig. 2.

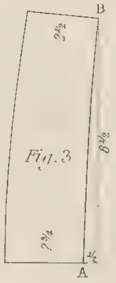


Fig. 3.

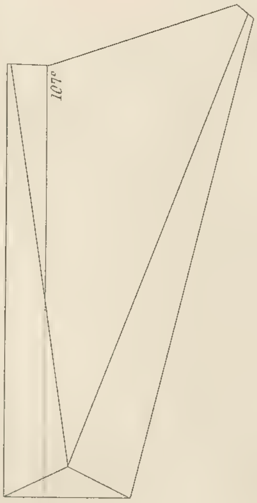


Fig. 4.

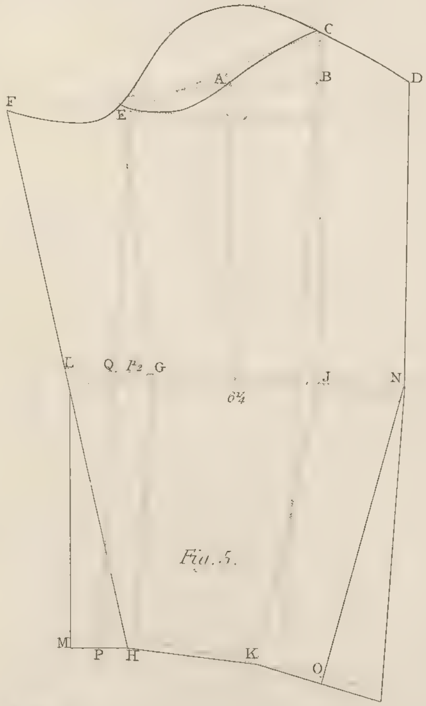


Fig. 5.

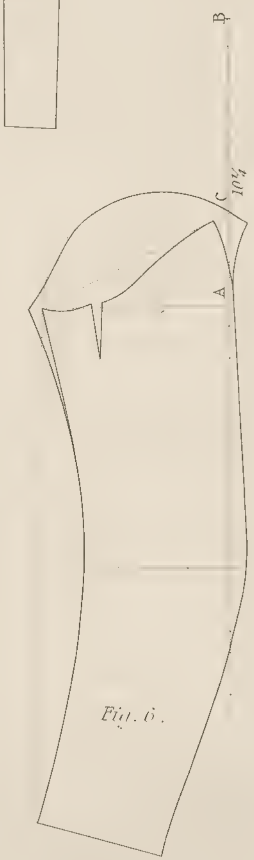
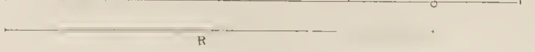


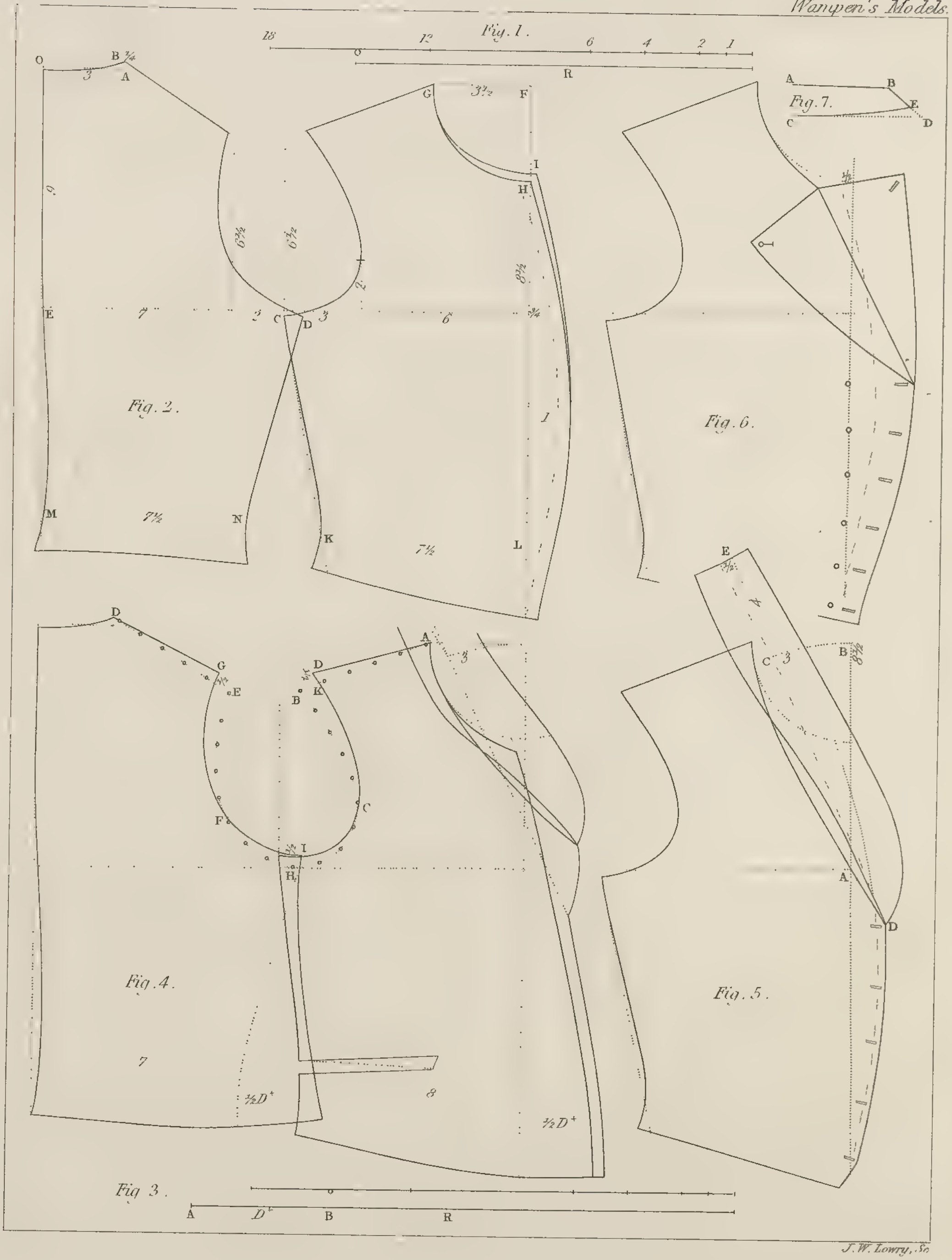
Fig. 6.



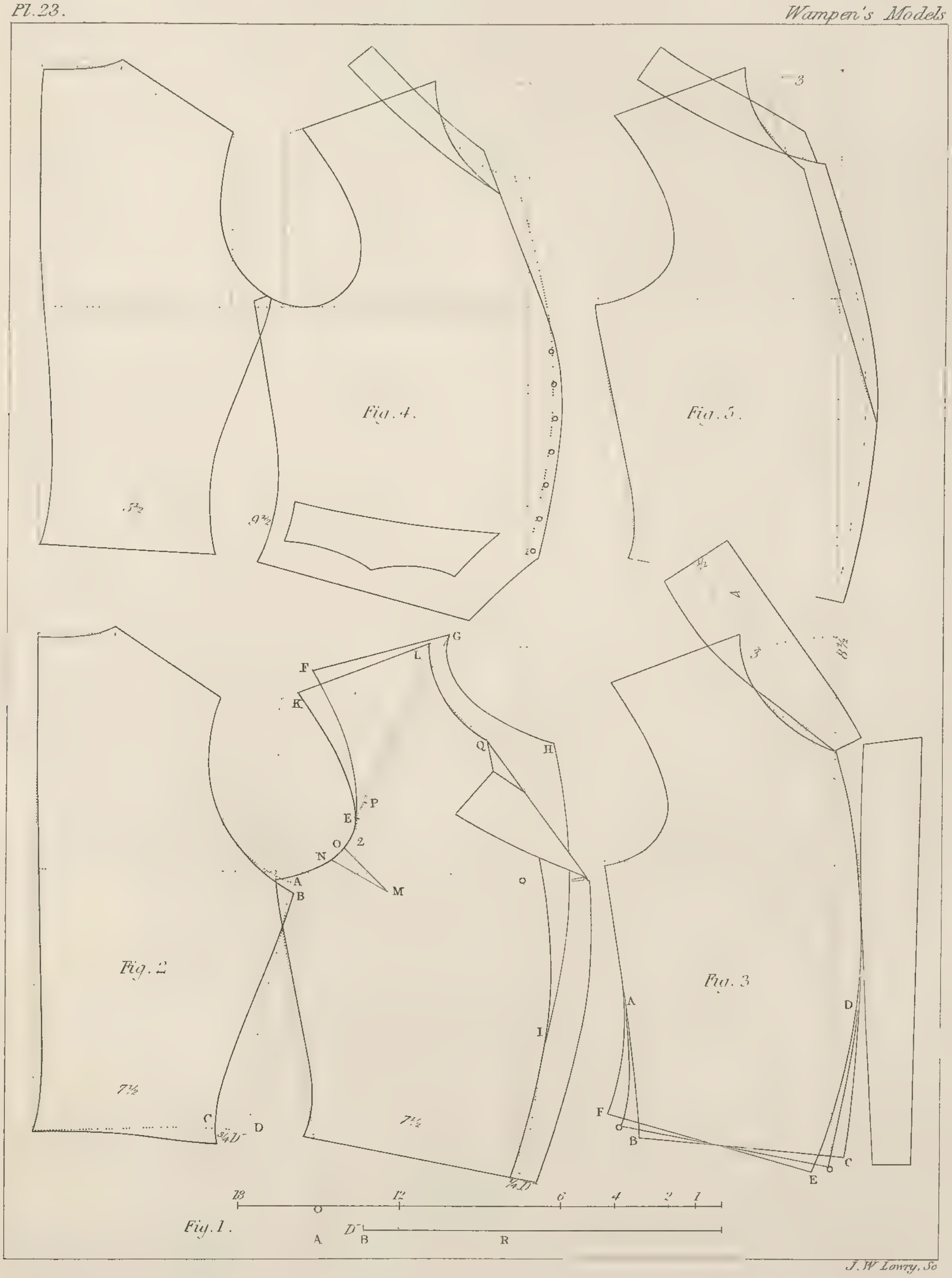
h-b,o

J. W. Lowry. Sc.

Pl. 22. Wampen's Models.



J. W. Lowry, Sc.


5½
9¾
Fig. 4.
Fig. 5.
3
½
4
3
8½
F
G
L
K
Q
H
P
E
O
2
N
A
B
M
Fig. 2
7½
C
3¼D
D
7½
I
¼D
A
D
Fig. 3
F
B
E
C
13
12
6
4
2
1
O
Fig. 1.
A
D
B
R

J. W. Lowry, Sc

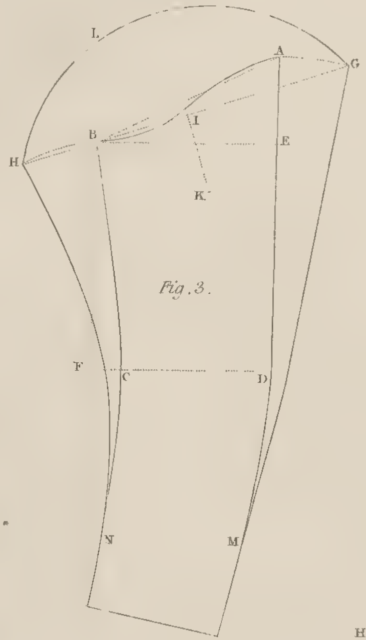


Fig. 3.

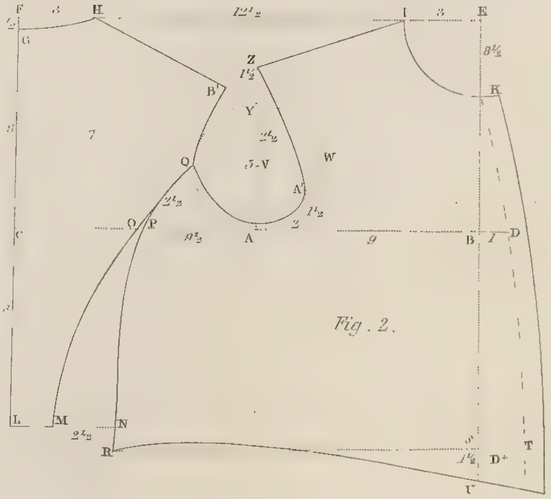


Fig. 2.

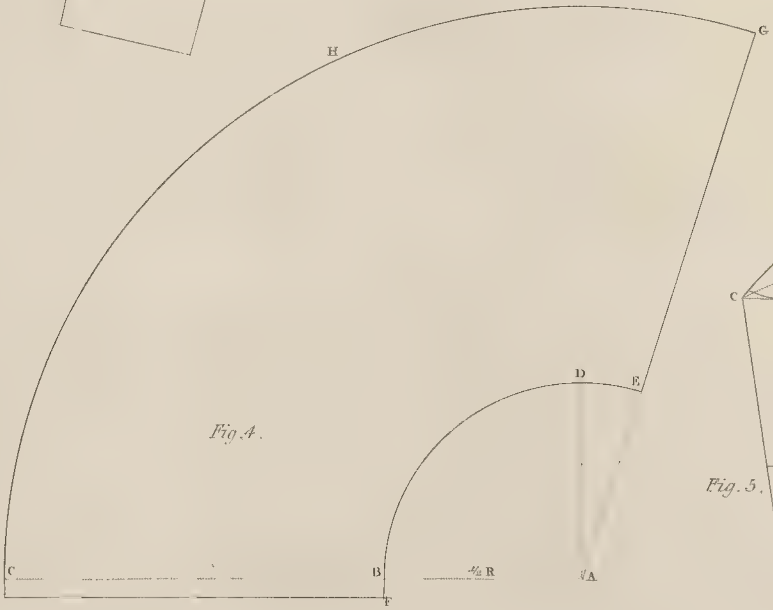


Fig. 4.

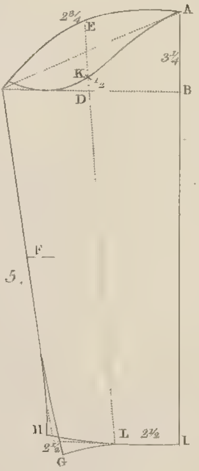


Fig. 5.

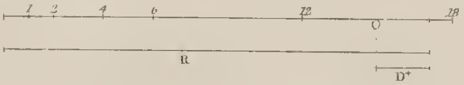


Fig. 1.

J. W. Lowry fc.

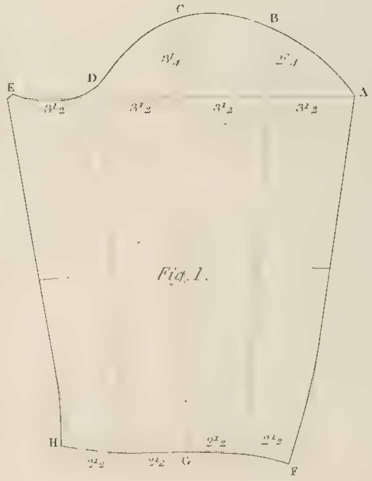


Fig. 1.

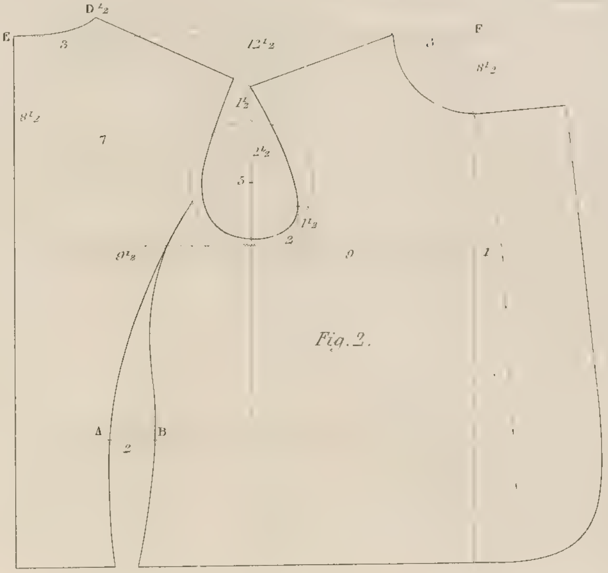


Fig. 2.

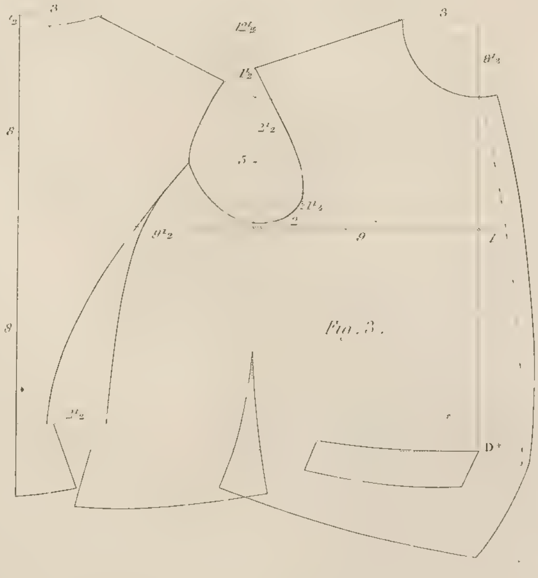


Fig. 3.

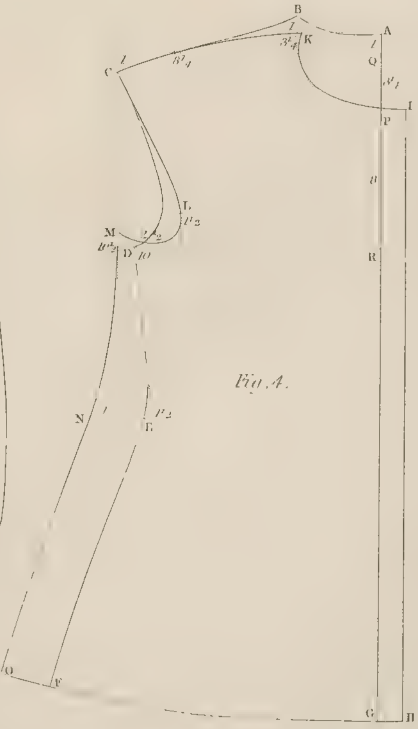


Fig. 4.

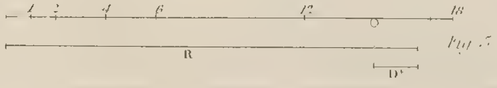
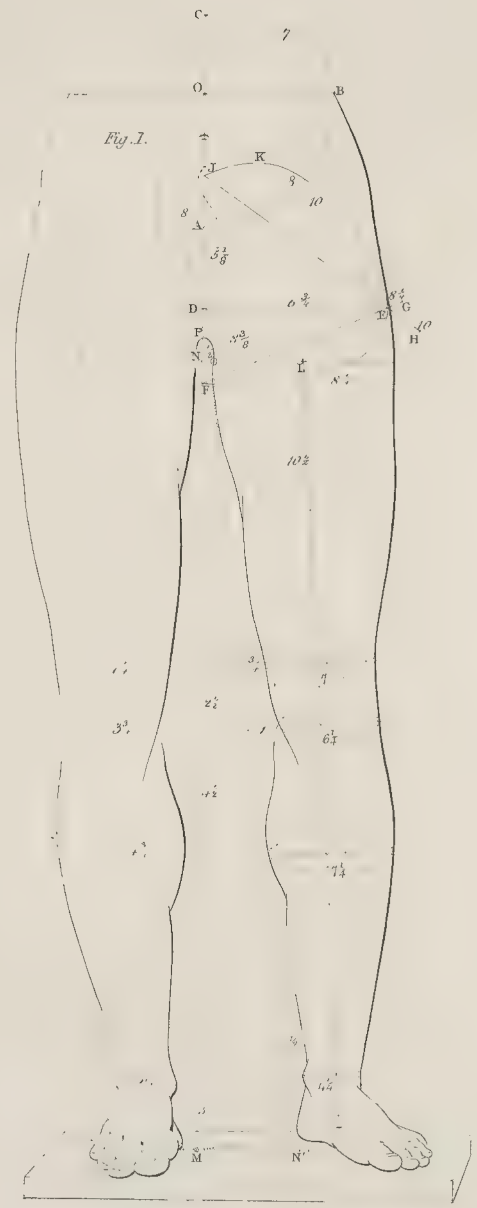


Fig. 5.

J. W. Lowry fc.

Pl. 26.



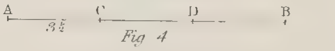


Fig 4

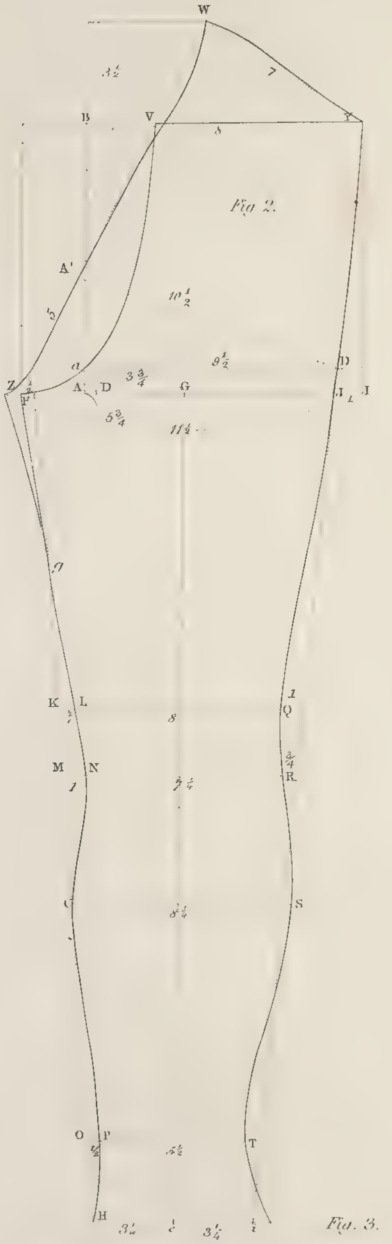
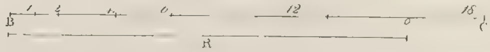


Fig. 3.



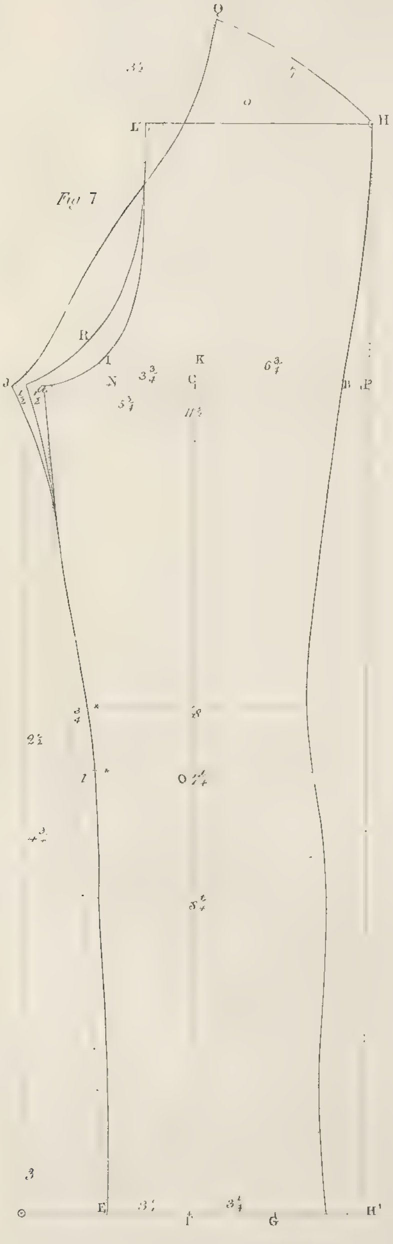


Fig 7

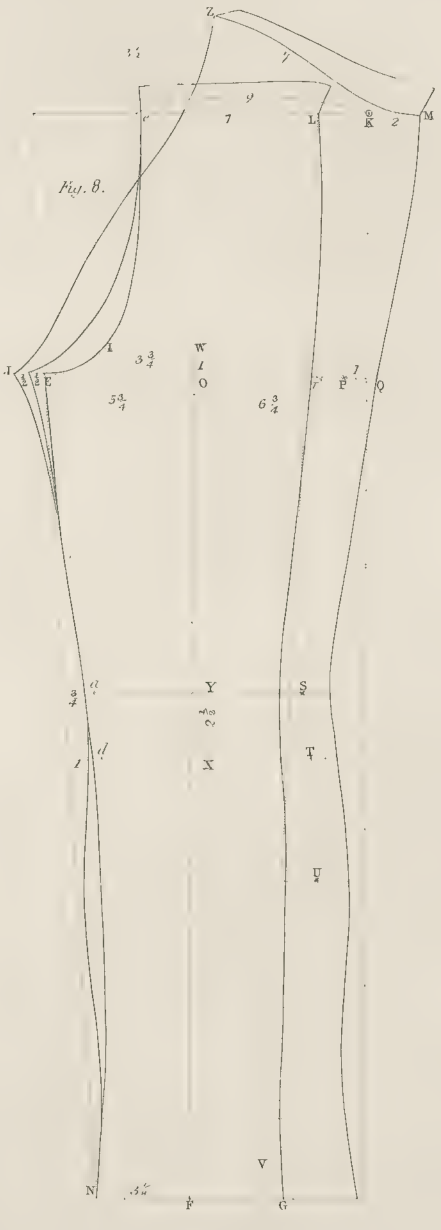


Fig. 8.

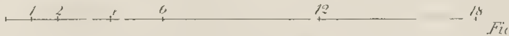


Fig. 9.

Pl. 21.

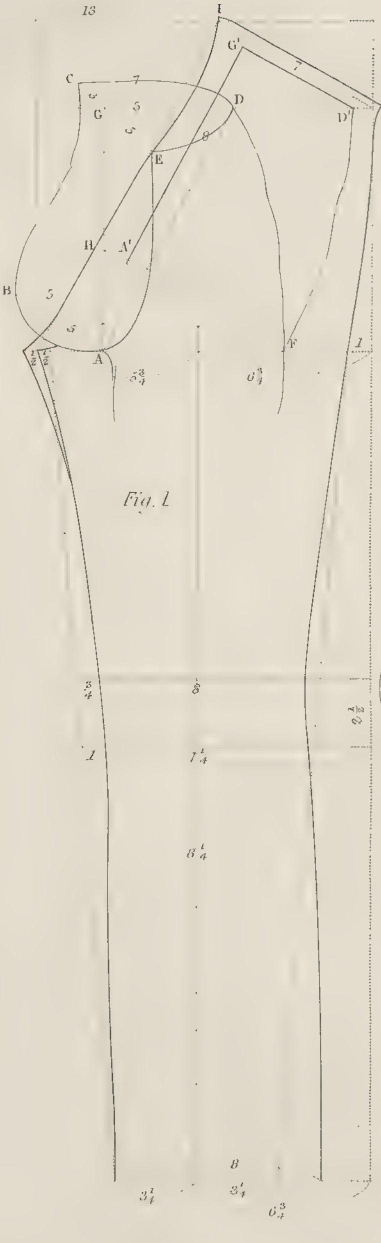


Fig. 1.

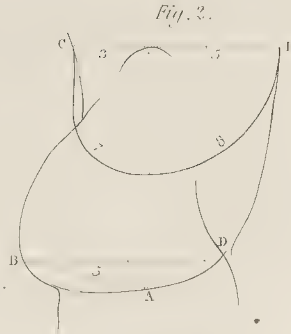


Fig. 2.

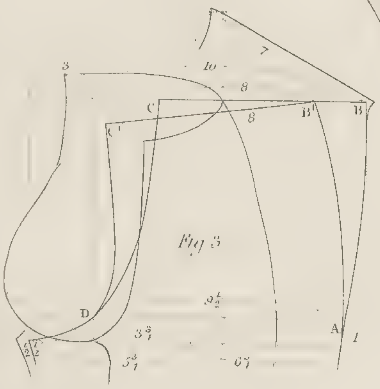


Fig. 3.

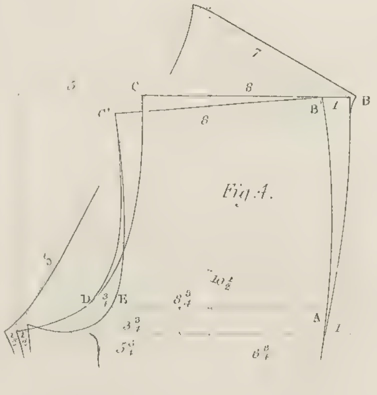


Fig. 4.

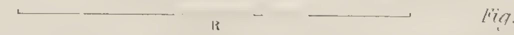


Fig. 5.

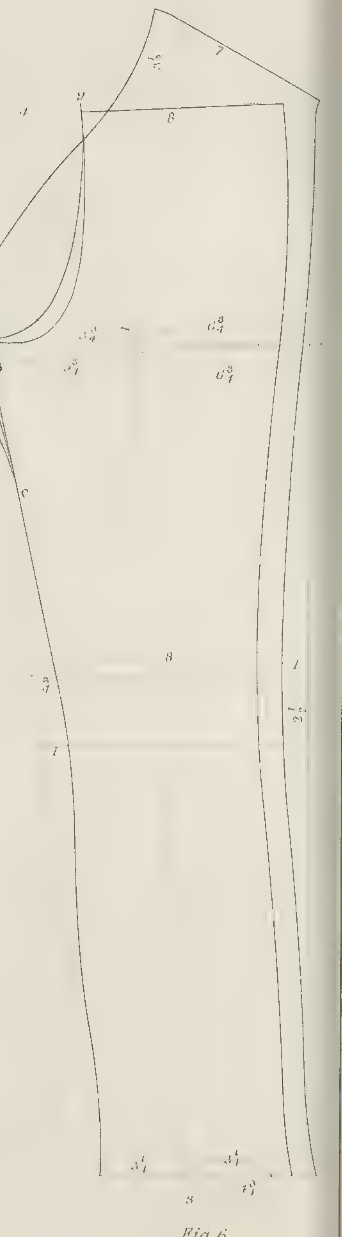


Fig. 6.

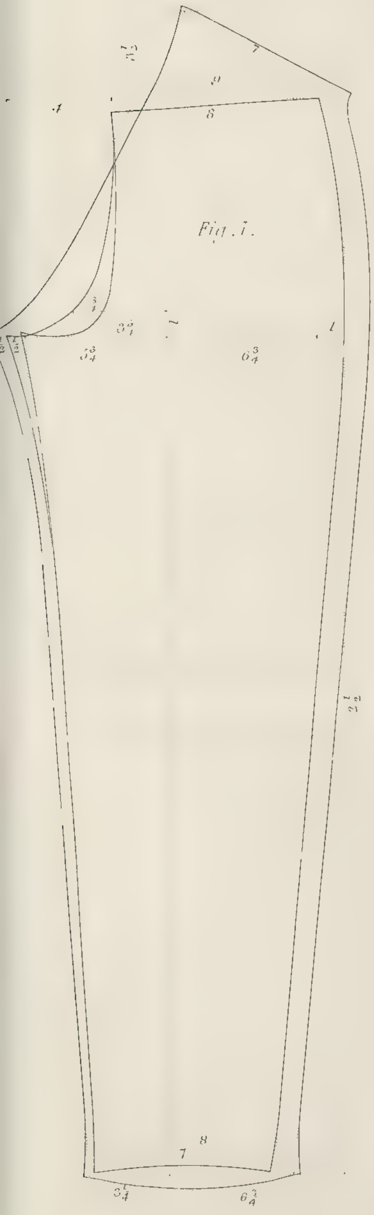


Fig. 7.

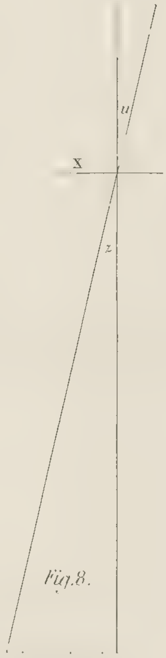


Fig. 8.

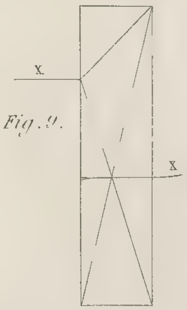


Fig. 9.

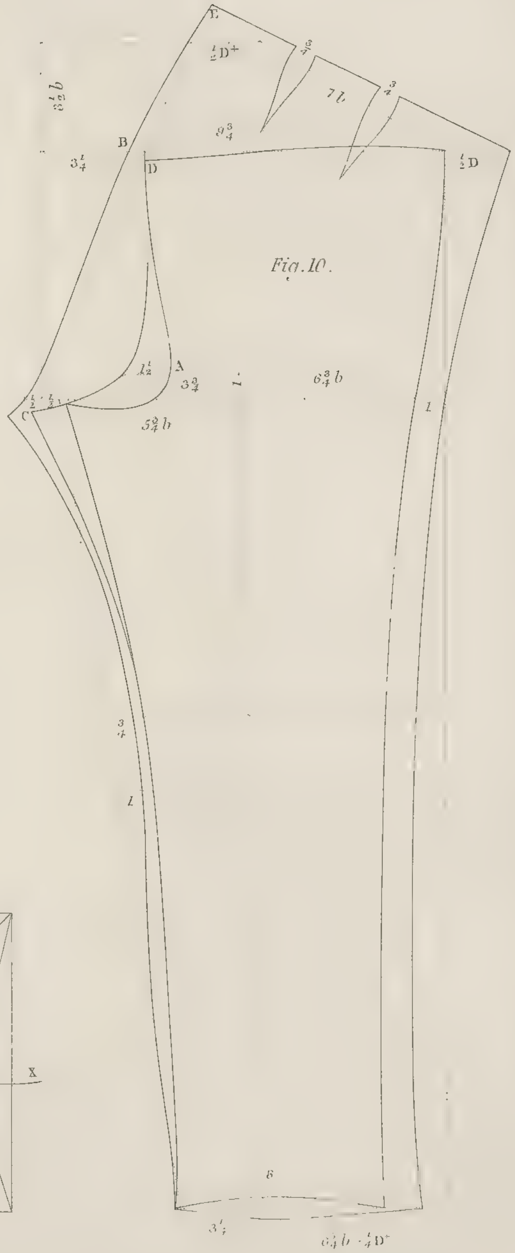


Fig. 10.

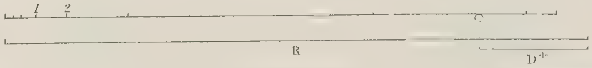
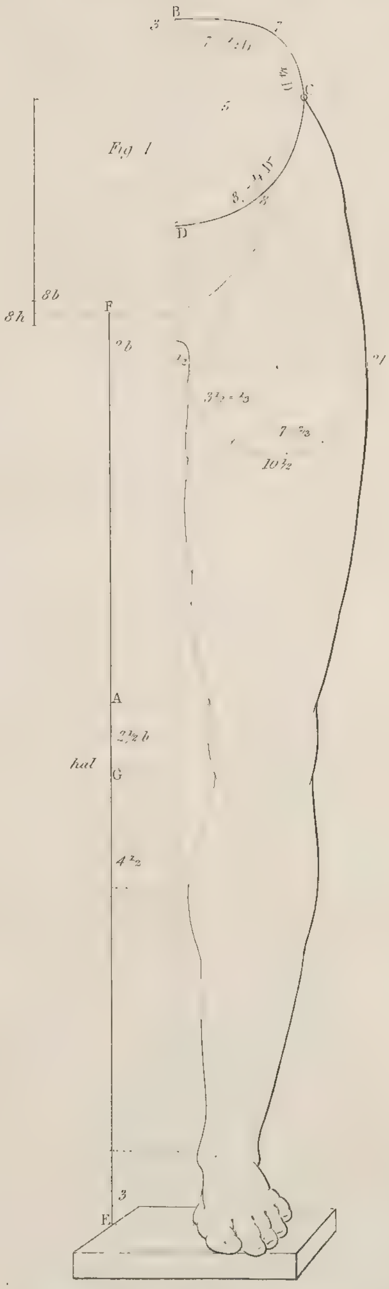


Fig 11.

J.W. Lowry fc

Pl 28

Fig 1



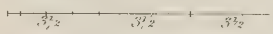


Fig 4.

h – h. D

Fig 2

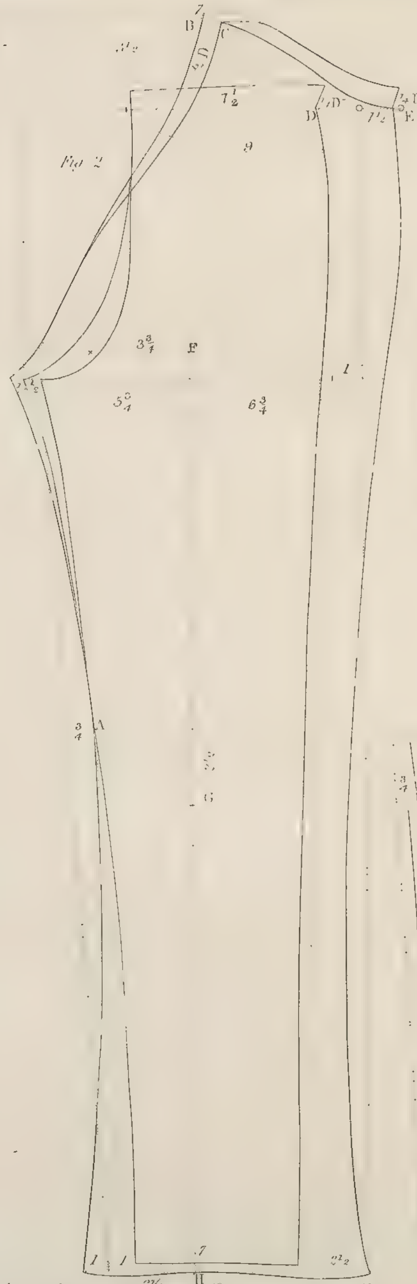


Fig 3

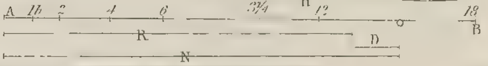


Fig. 8.

Fig. 5.

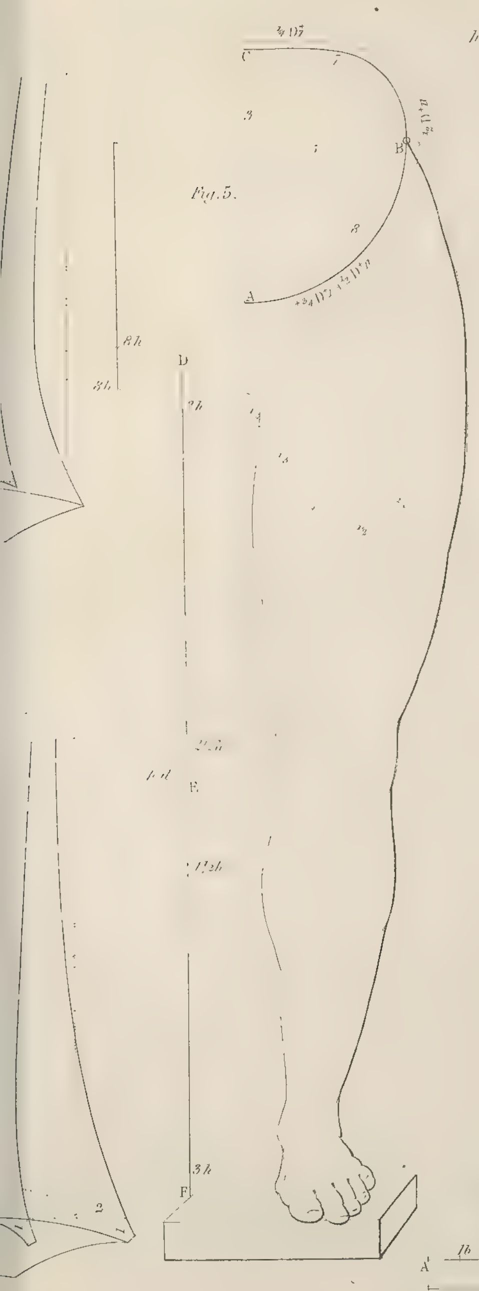


Fig. 6

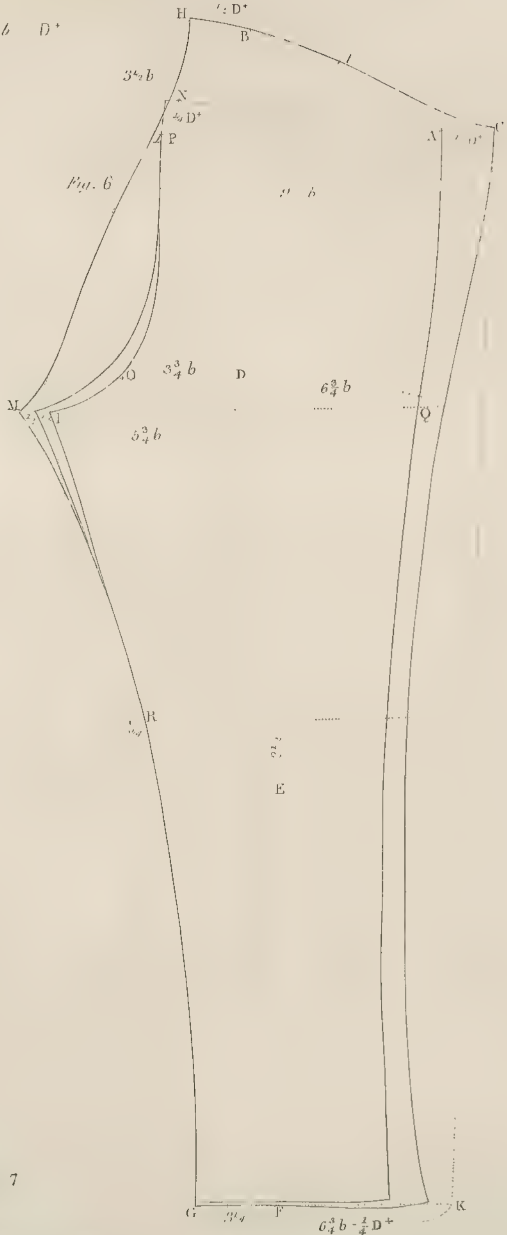
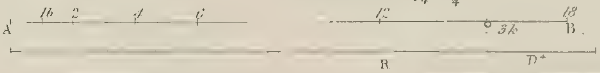


Fig 7



J.W. Lowry Sc.

Pl. 29.

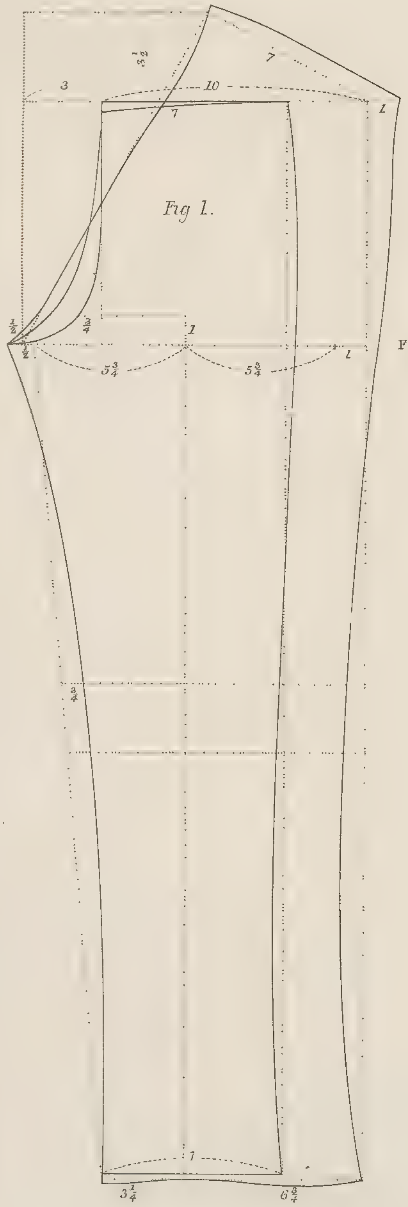


Fig 1.

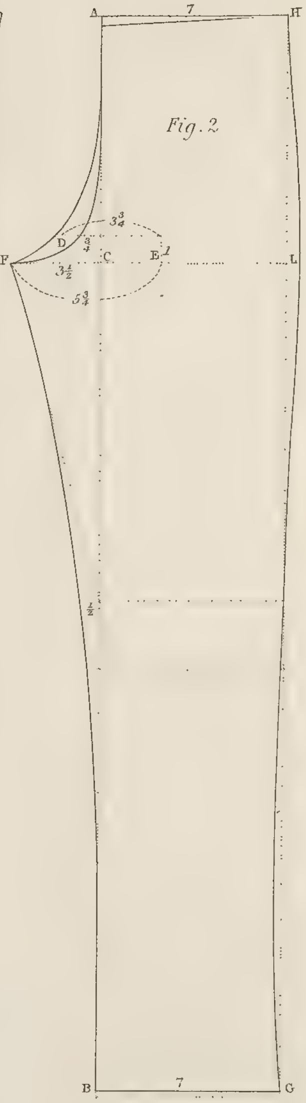


Fig. 2.

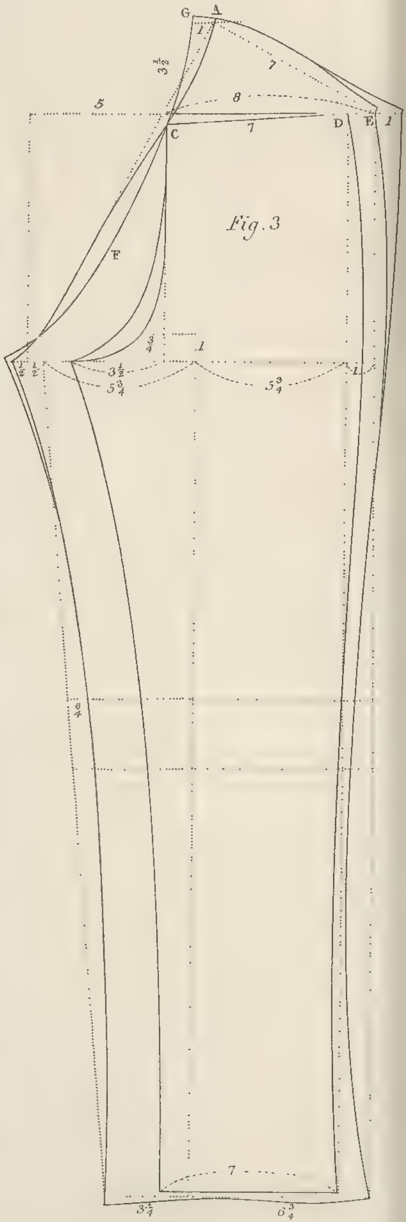
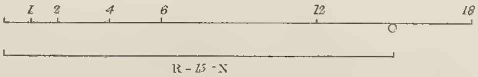


Fig. 3



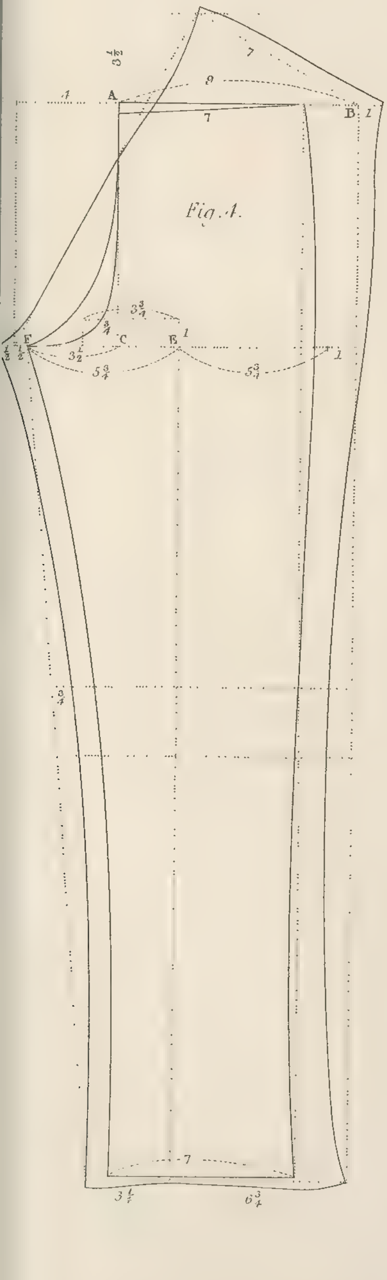


Fig. 4.

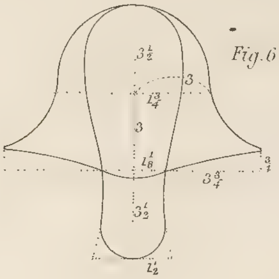


Fig. 6.

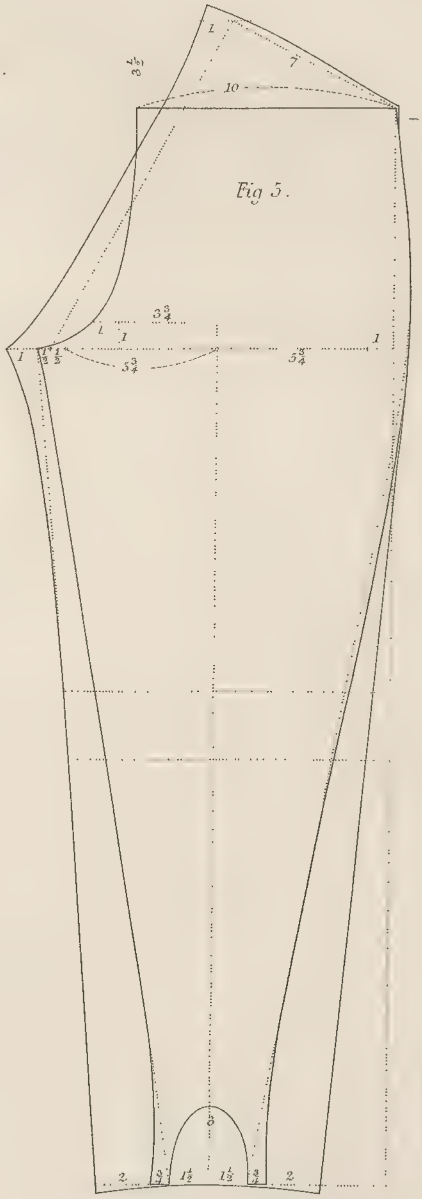


Fig. 5.

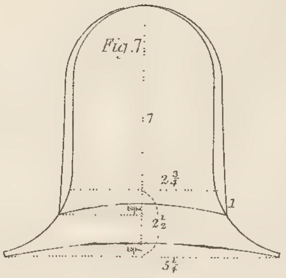


Fig. 7.

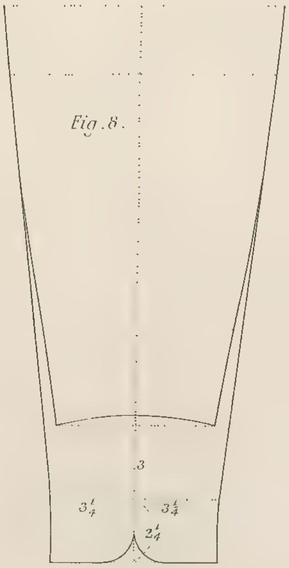


Fig. 8.

J.W. Lowry fc.

Pl. 30

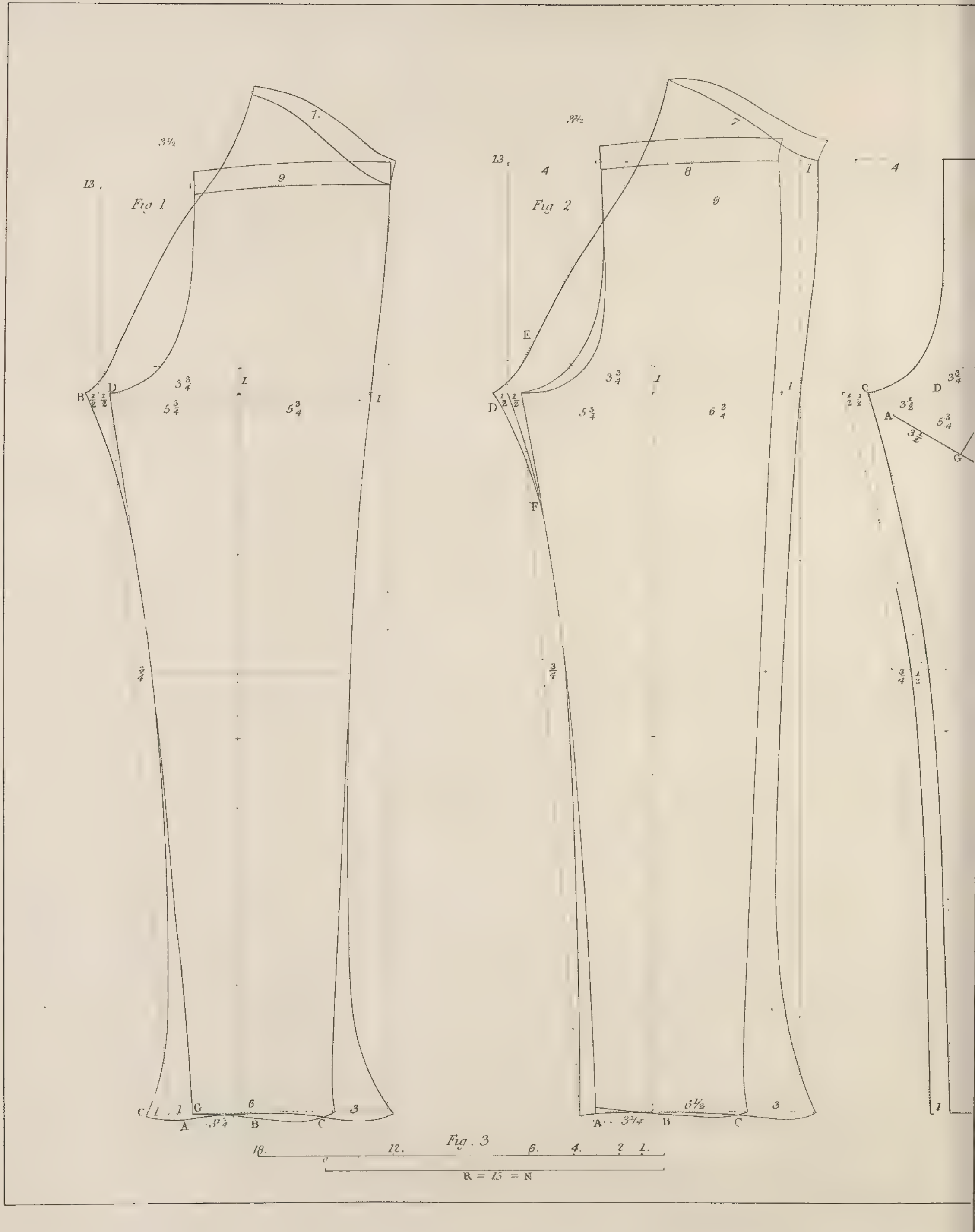
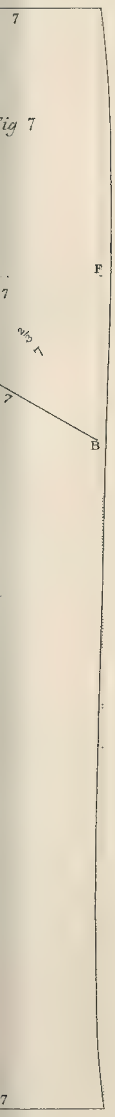
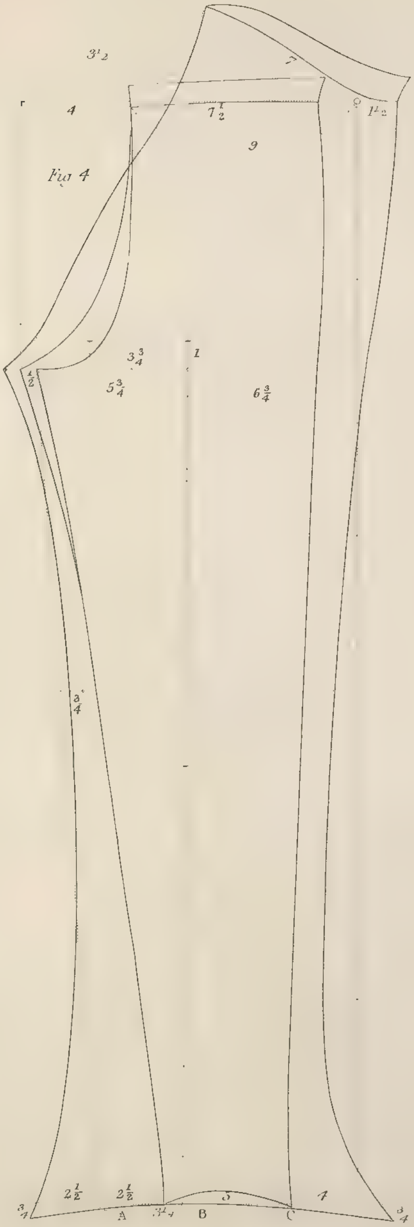


Fig 1
Fig 2
Fig. 3
13
3½
7
9
8
4
1
B
D
E
F
G
A
C
½
¾
3¾
5¾
6¾
3½
6
6½
3
18.
12.
6.
4.
2
1.
R = 15 = N





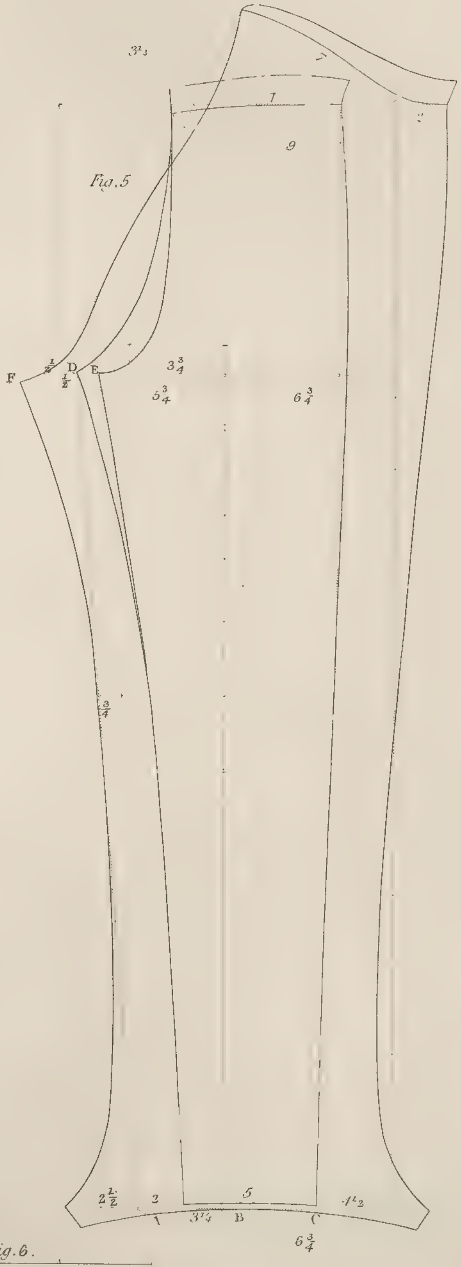
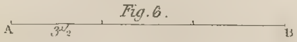


Fig. 6.



J.W. Lowry fc.

Pl. 31.

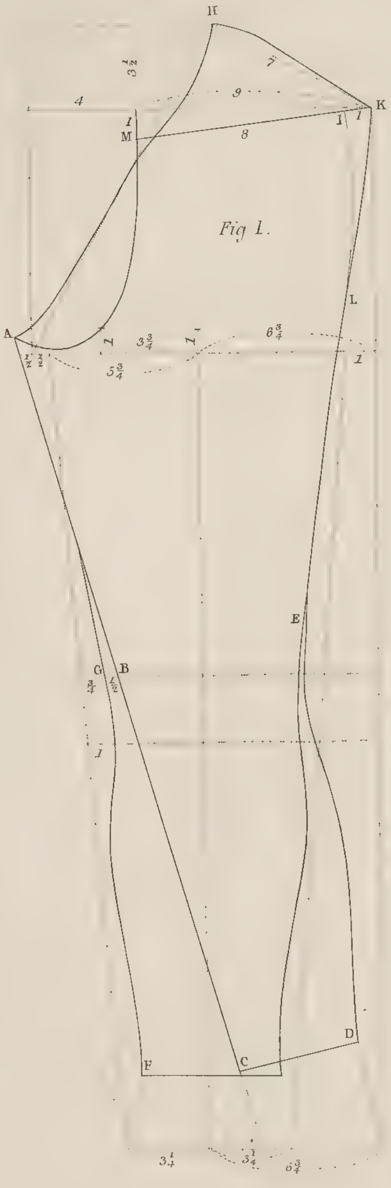


Fig 1.

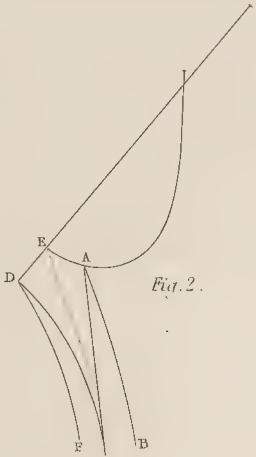


Fig. 2.

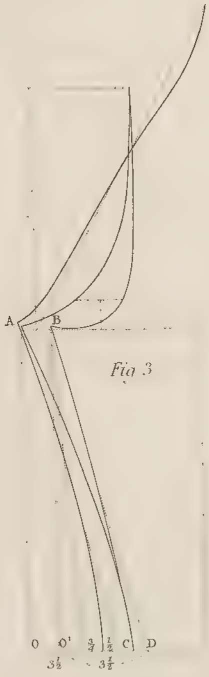


Fig 3

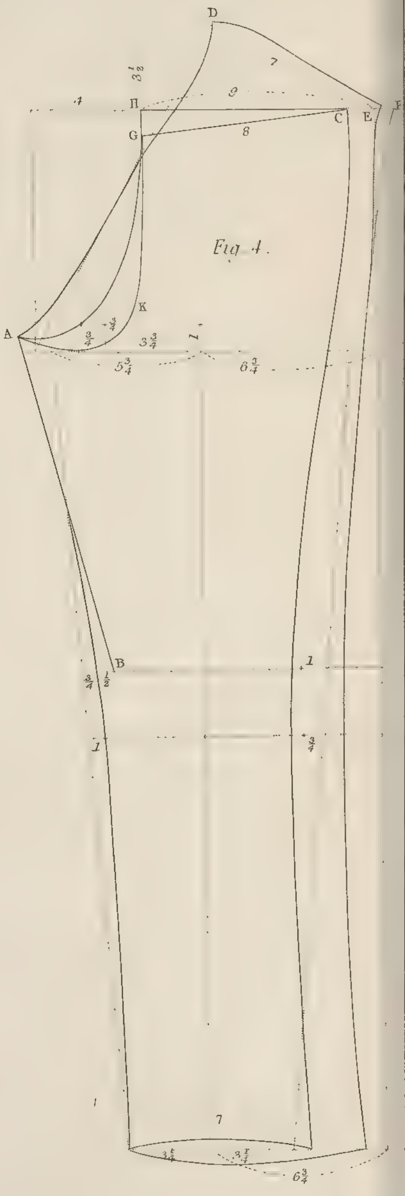
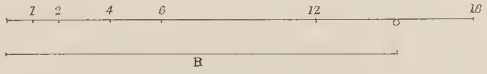


Fig. 4.



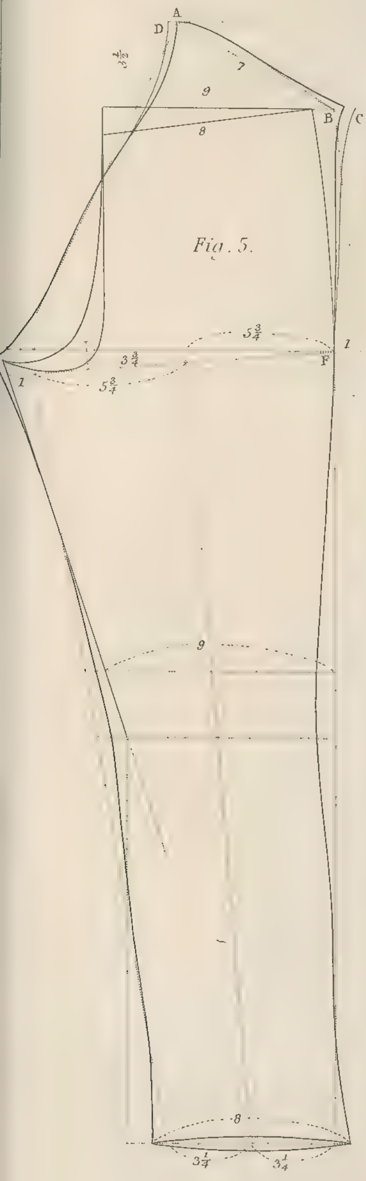


Fig. 5.

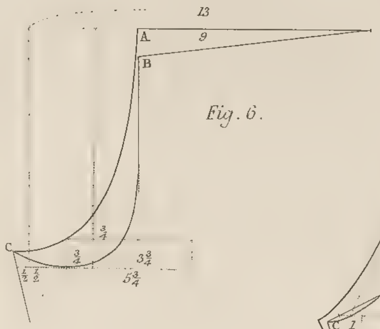


Fig. 6.

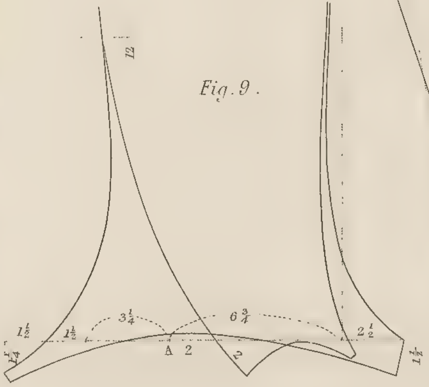


Fig. 9.

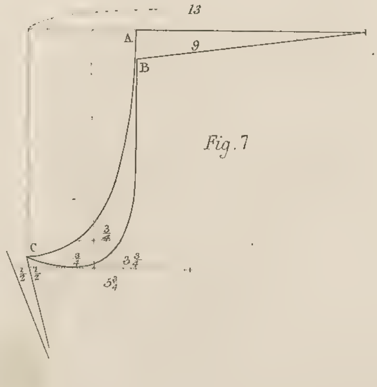


Fig. 7

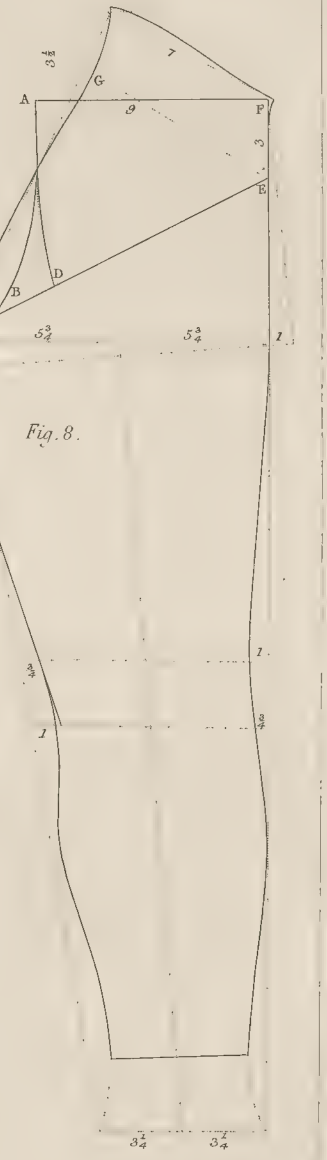


Fig. 8.

J. W. Lowry, fc.

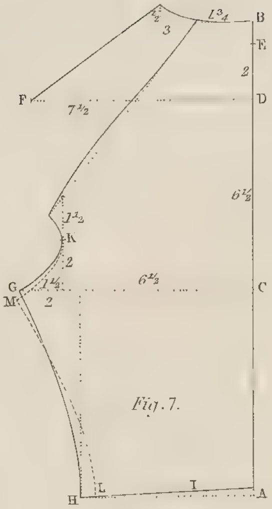


Fig. 7.

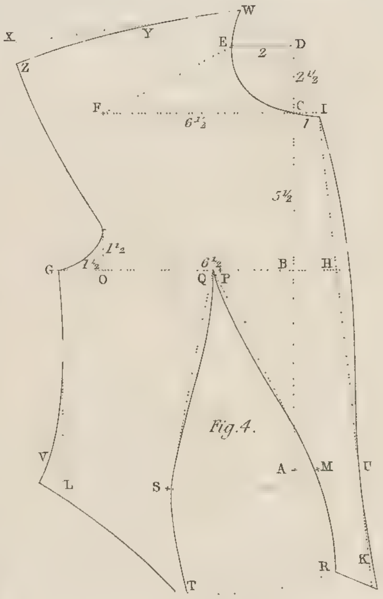


Fig. 4.

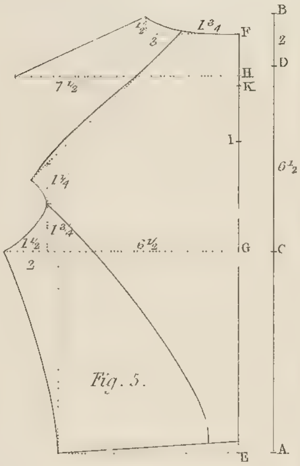


Fig. 5.

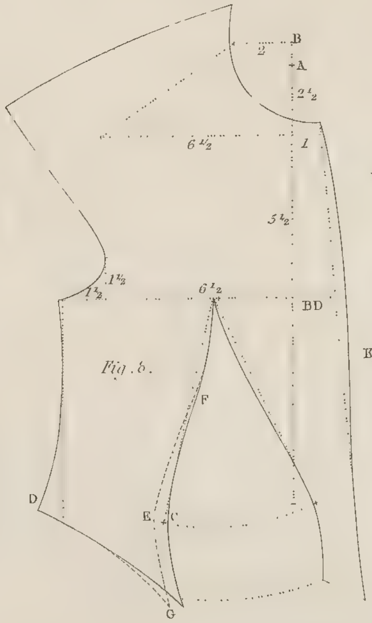


Fig. 8.

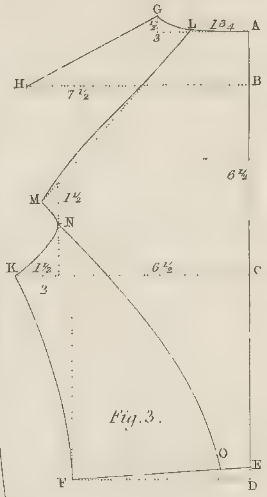


Fig. 3.

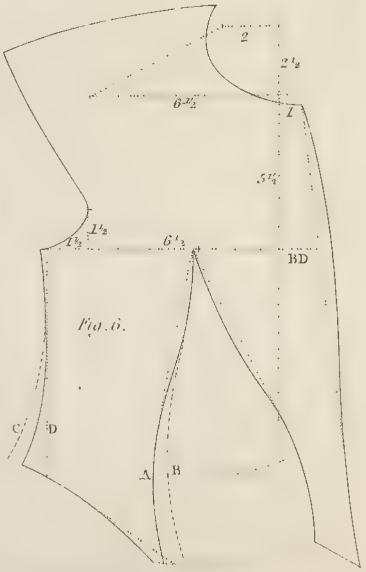


Fig. 6.

Fig. 1.

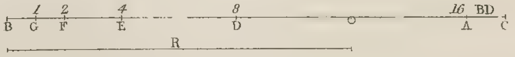
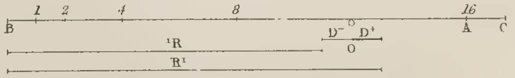


Fig. 2.



J. W. Lowry fc.

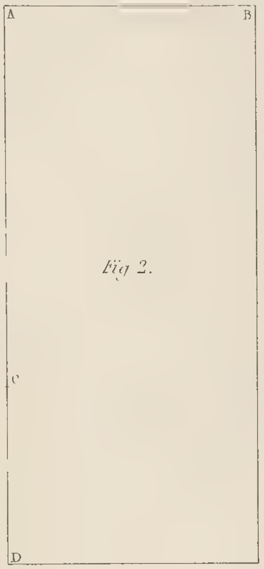


Fig. 2.

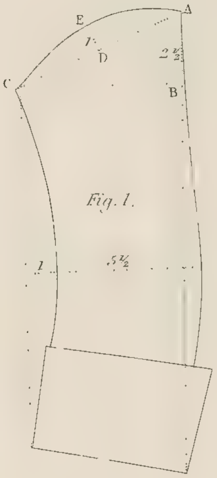


Fig. 1.

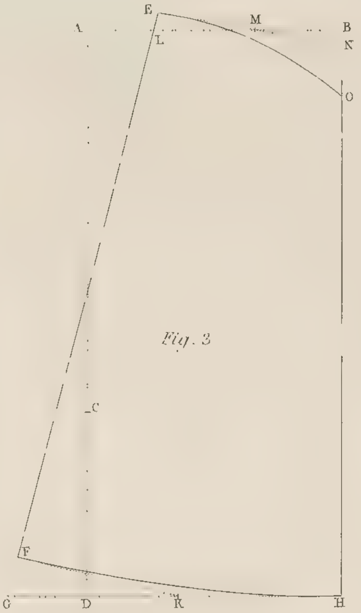


Fig. 3

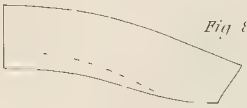


Fig. 8

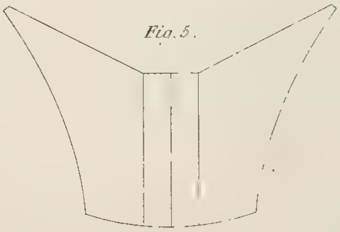


Fig. 5.

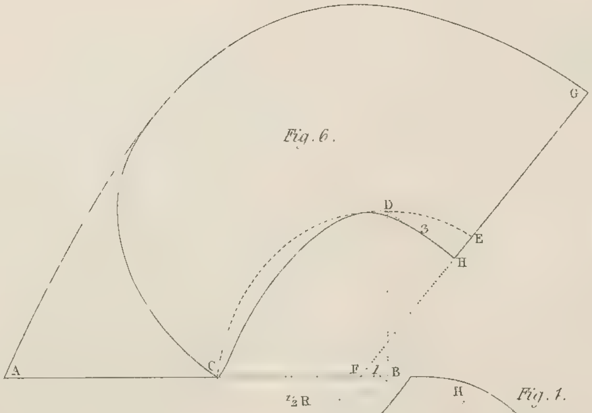


Fig. 6.

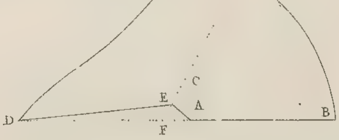


Fig. 4.

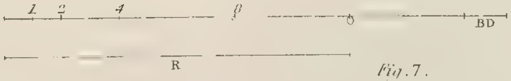


Fig. 7.

J. W. Lowry fc.

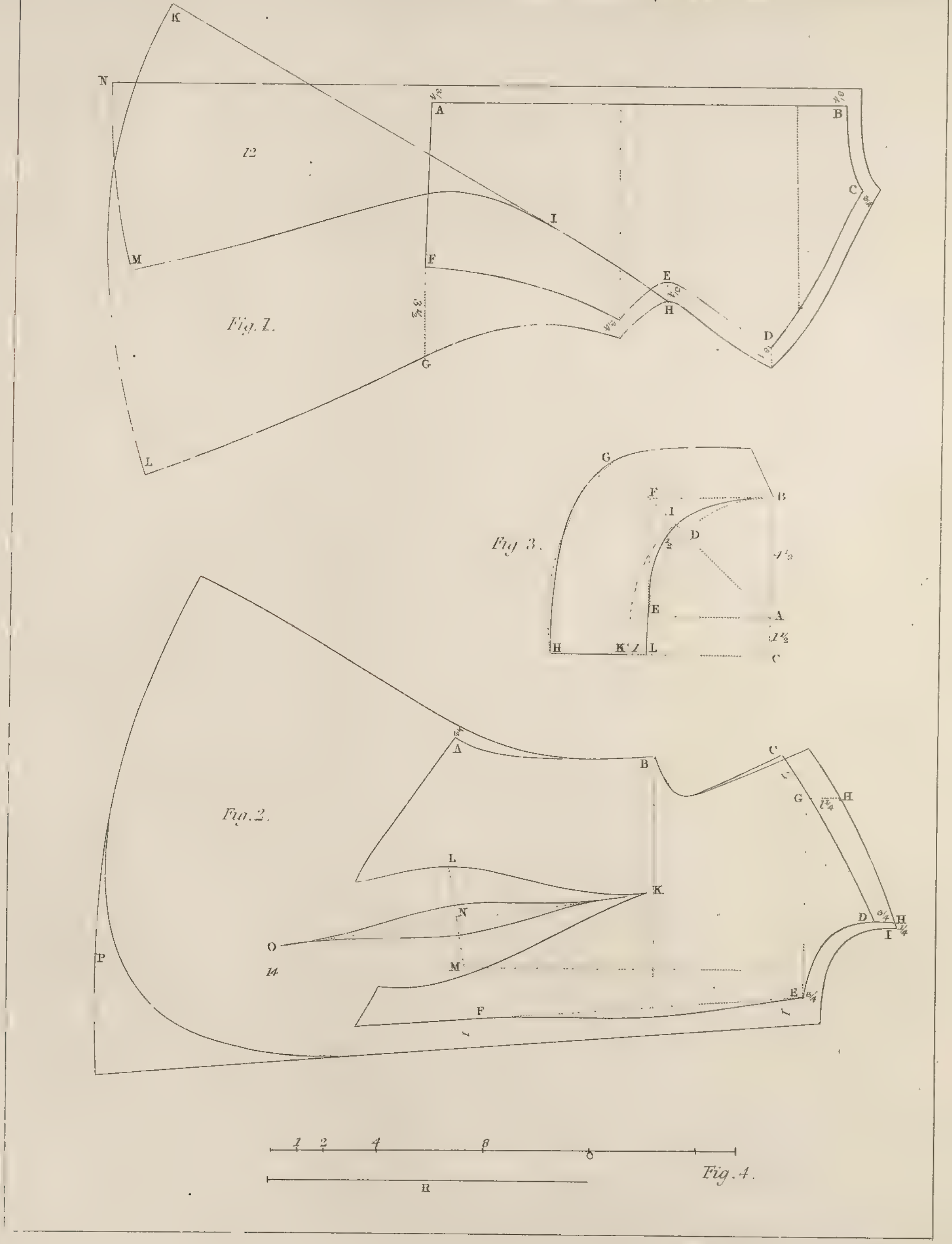
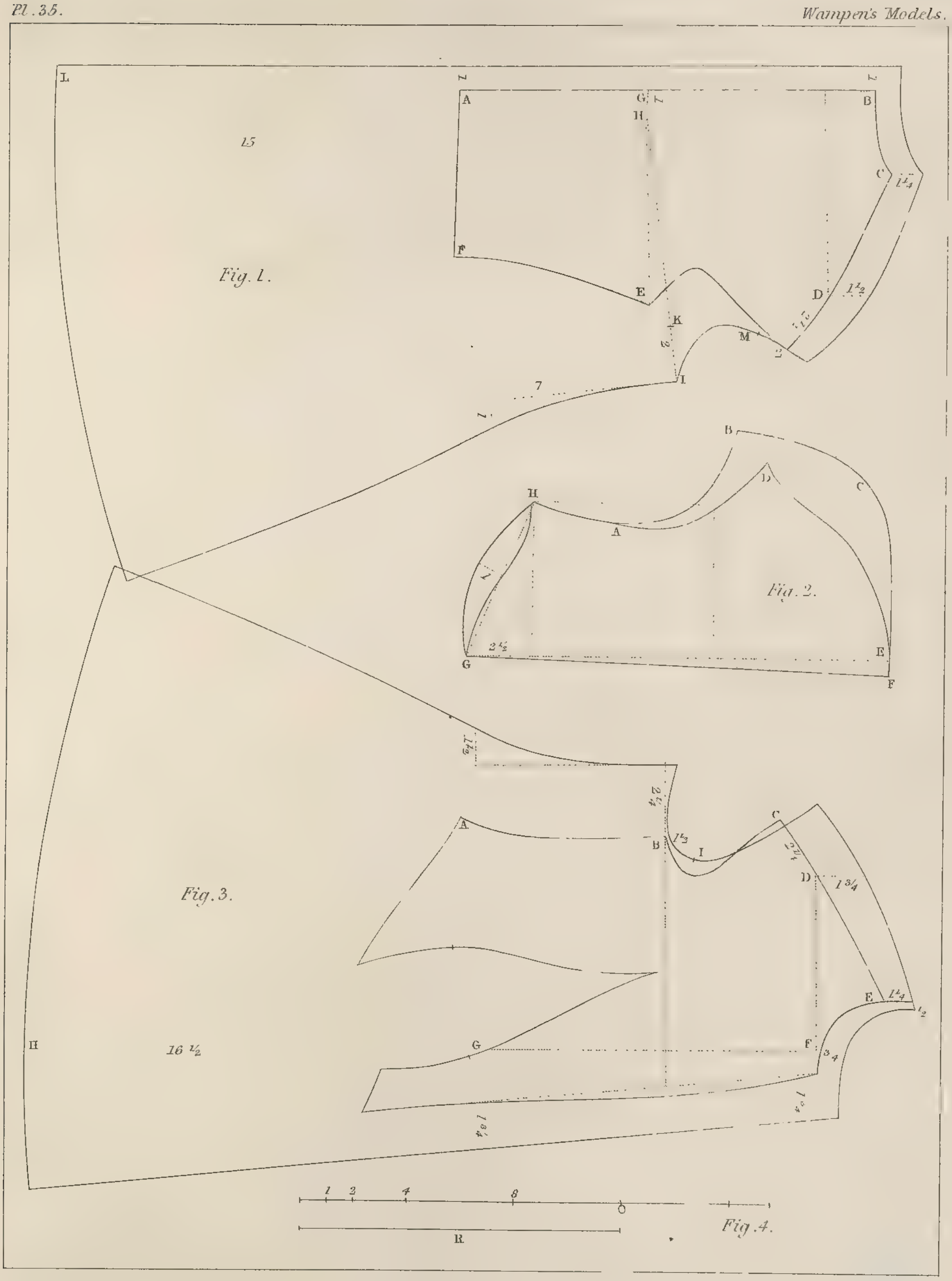


Fig. 1.
K
N
A
B
C
I
M
F
E
H
D
G
L
12
3½
Fig. 3.
G
F
B
I
D
E
A
H
K' L
C
1½
Fig. 2.
A
B
C
G
H
L
K
N
O
M
P
D
I
E
F
14
1 2 4 8
R
Fig. 4.

J. W. Lowry fc.


L
15
Fig. 1.
A
G
H
B
C
$1\frac{1}{4}$
F
E
K
2
I
M
D
$1\frac{1}{2}$
7
1
B
D
C
H
A
Fig. 2.
G
$2\frac{1}{2}$
E
F
$1\frac{1}{2}$
$2\frac{1}{4}$
Fig. 3.
A
B
$1\frac{1}{2}$
I
C
$2\frac{1}{4}$
D
$1\frac{3}{4}$
E
$1\frac{1}{4}$
$\frac{1}{2}$
H
$16\frac{1}{2}$
G
F
$\frac{3}{4}$
$1\frac{3}{4}$
$1\frac{3}{4}$
1
2
4
8
0
R
Fig. 4.

W. J. Lowry fc

Pl. 36.

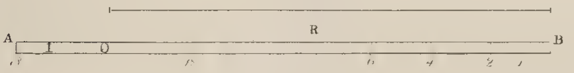


Fig. 1.

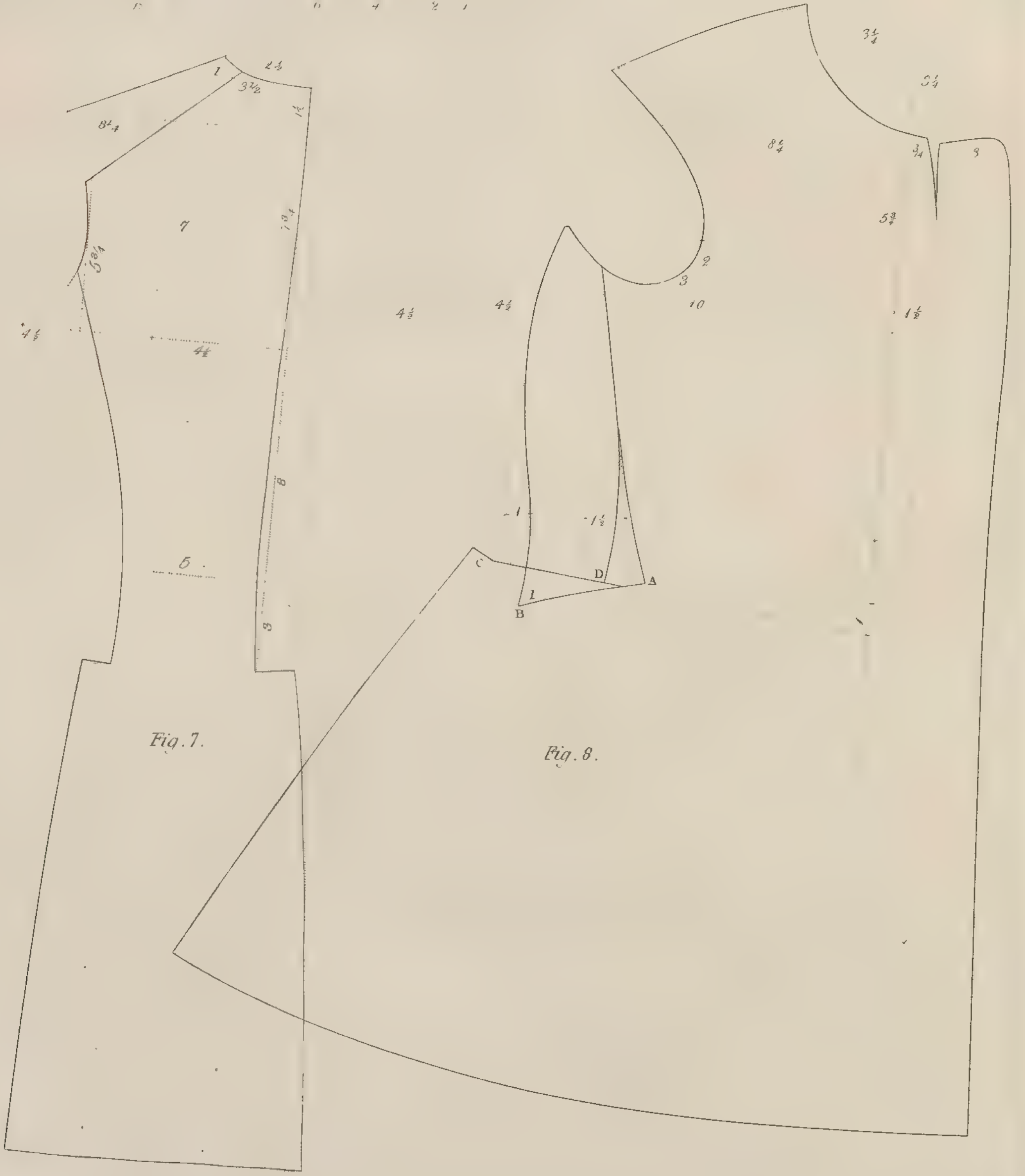


Fig. 7.

Fig. 8.

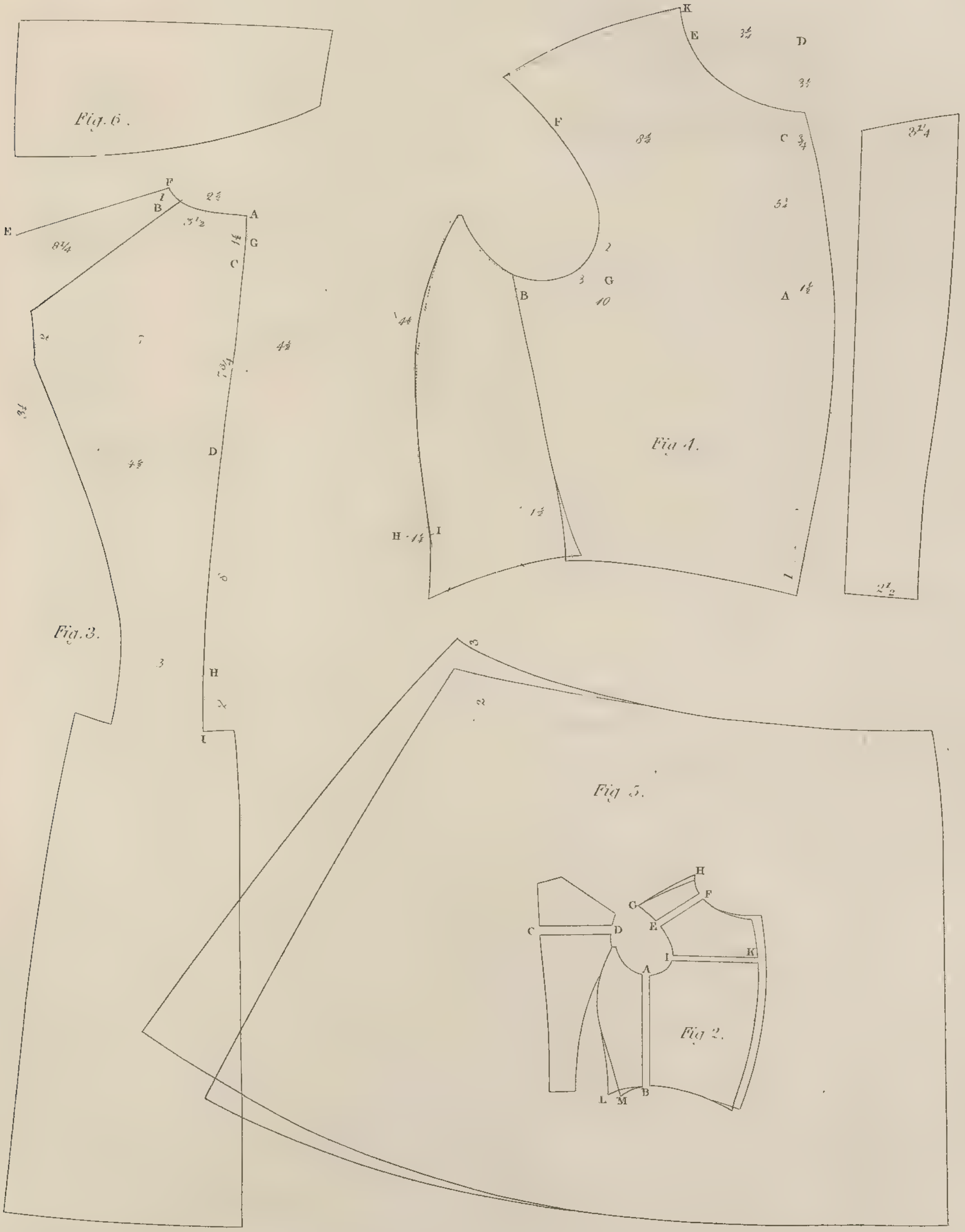


Fig. 6.
F
1
2½
B
3½
A
E
8¼
1¼
G
C
2
7
4½
7¾
7¾
D
4⅝
8
Fig. 3.
3
H
7
I
K
E
3½
D
3½
F
8½
C
¾
5½
2
3
G
B
10
A
1¼
44
1½
H
1¼
I
3¼
2½
Fig 4.
8
2
Fig 5.
H
F
G
E
C
D
K
I
A
Fig 2.
L
M
B

J.W Lowry fc

Pl. 37.

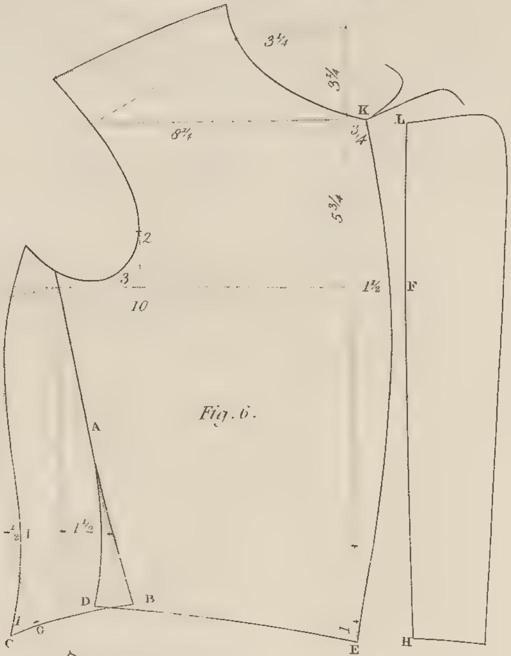


Fig. 6.

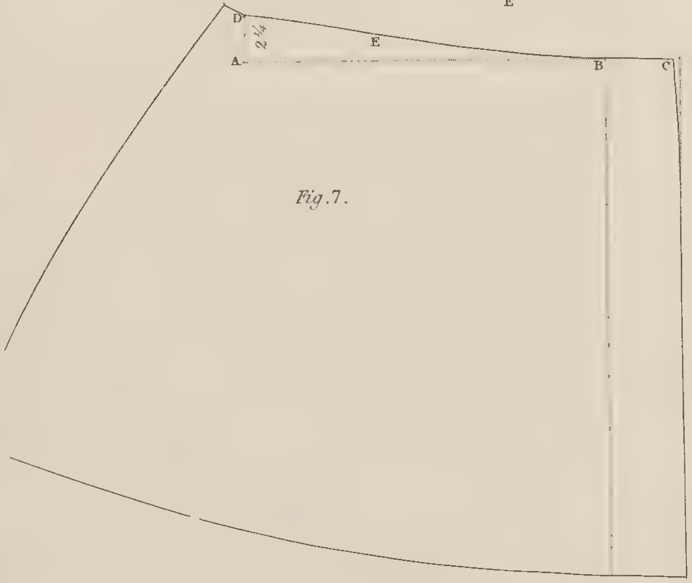


Fig. 7.

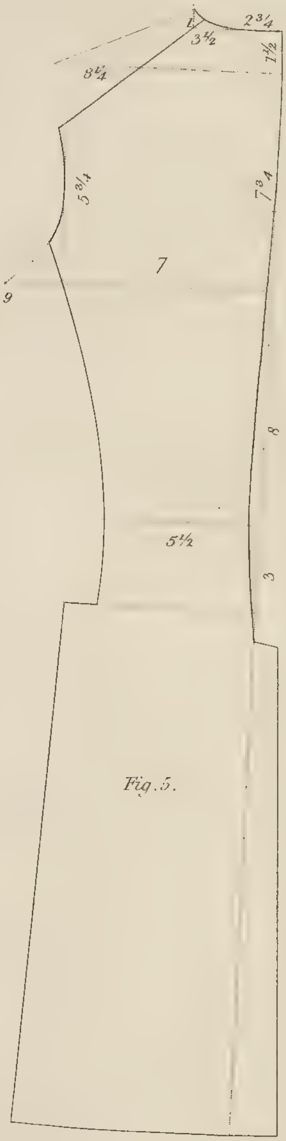


Fig. 5.

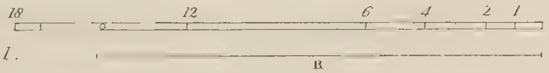
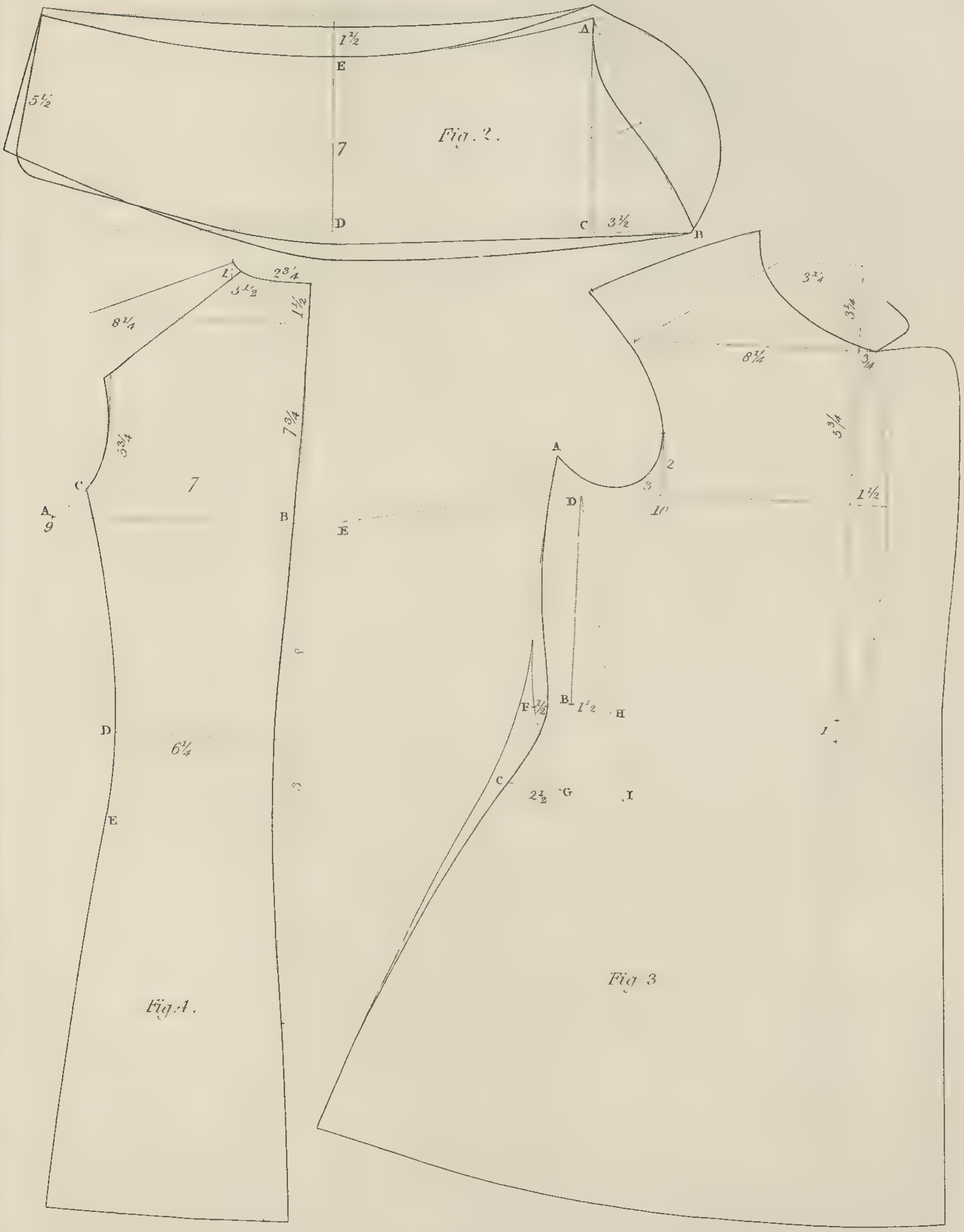


Fig. 1.


1½
E
5½
Fig. 2.
7
A
D
C
3½
B
L
2¾
3½
1½
8¼
7¾
3¾
C
7
A
9
B
E
D
6¼
E
Fig. 4.
3¼
3¼
8¼
¾
5¾
A
2
3
10
1½
D
F
½
B
1½
H
1
C
2½
G
I
Fig. 3

J.W. Lowry sc.

Pl. 38.

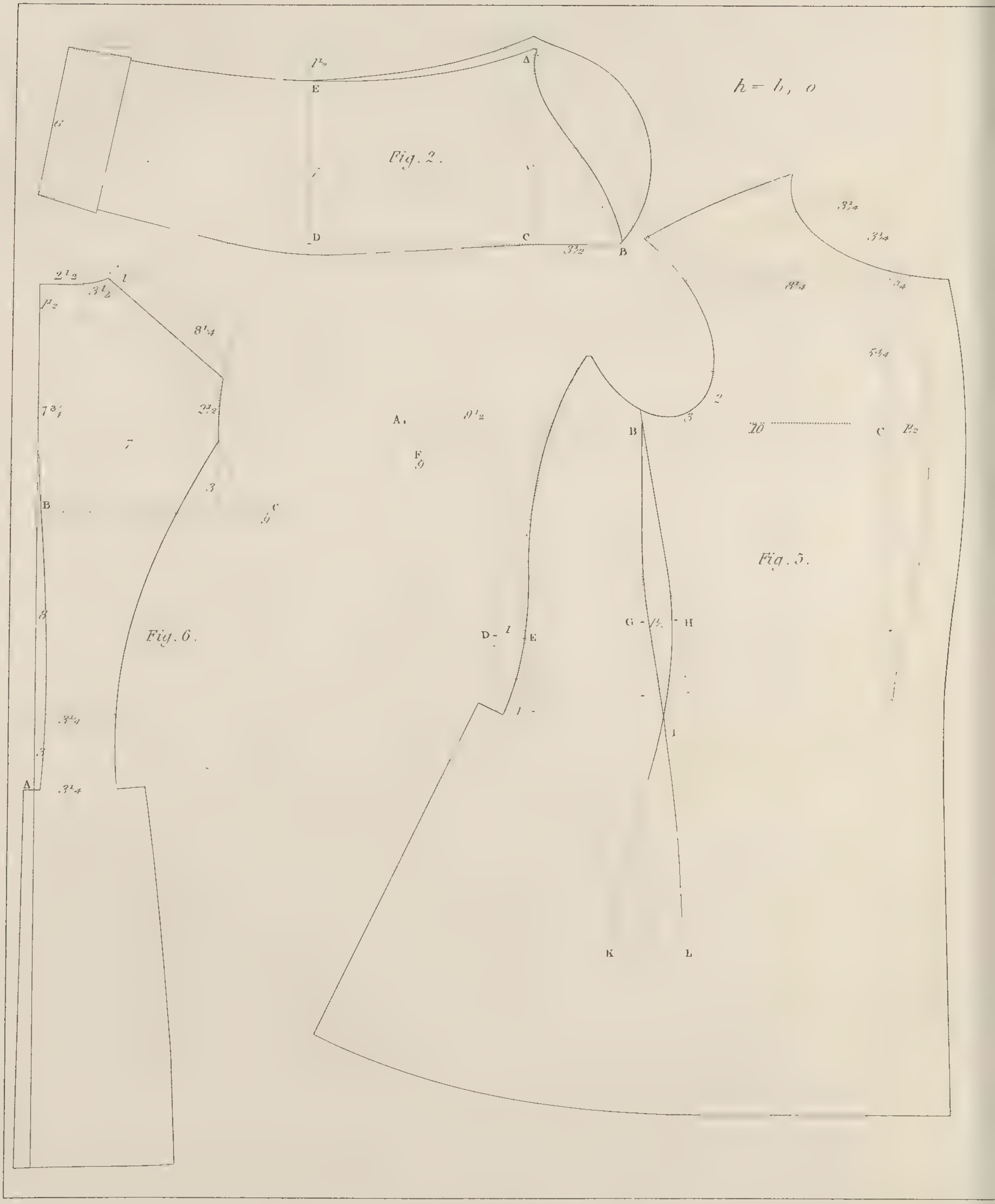
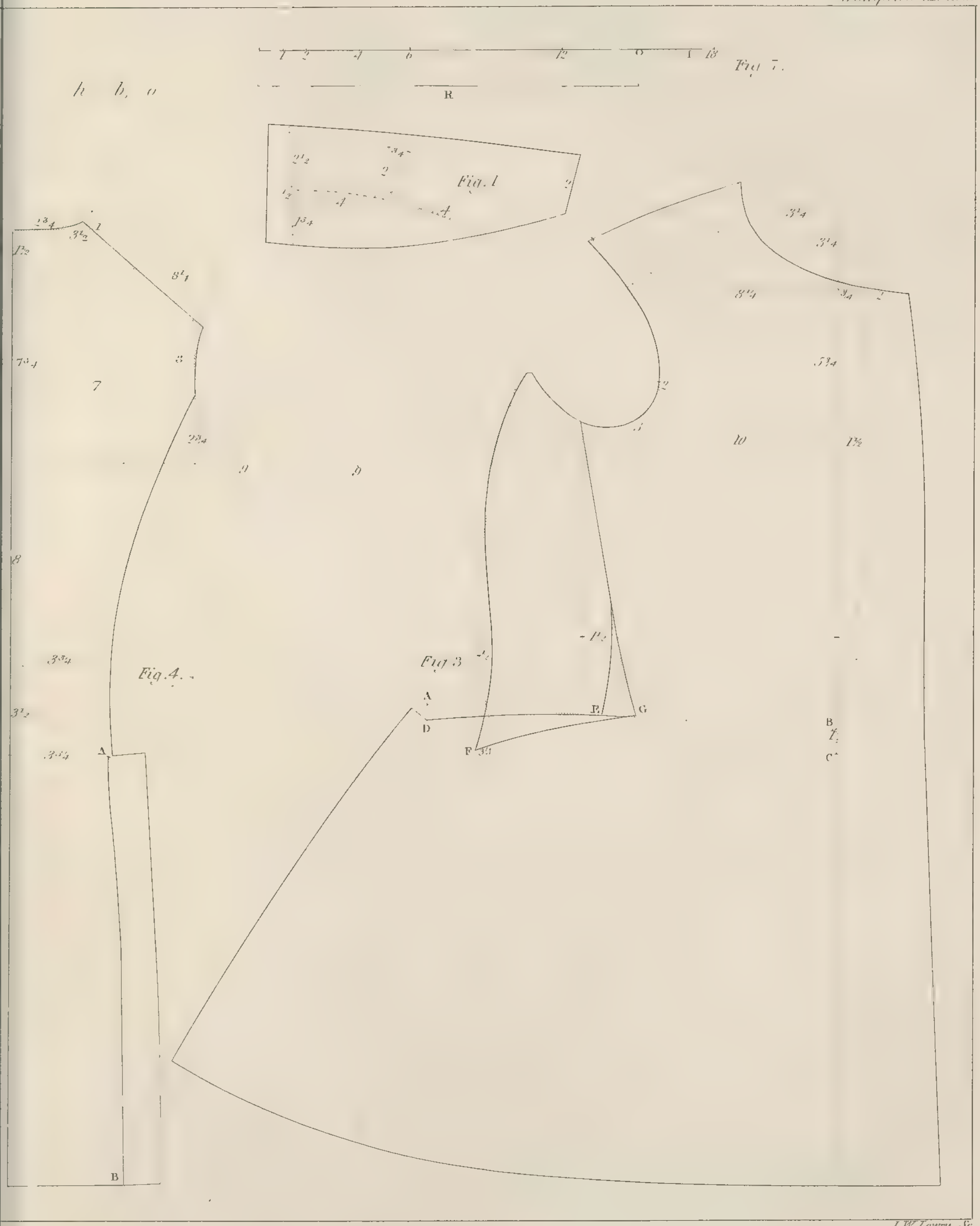


Fig. 2.

Fig. 5.

Fig. 6.



J. W. Lowry, Sc.

Pl. 39.

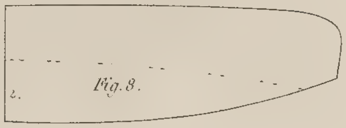


Fig. 8.

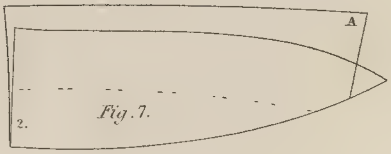


Fig. 7.

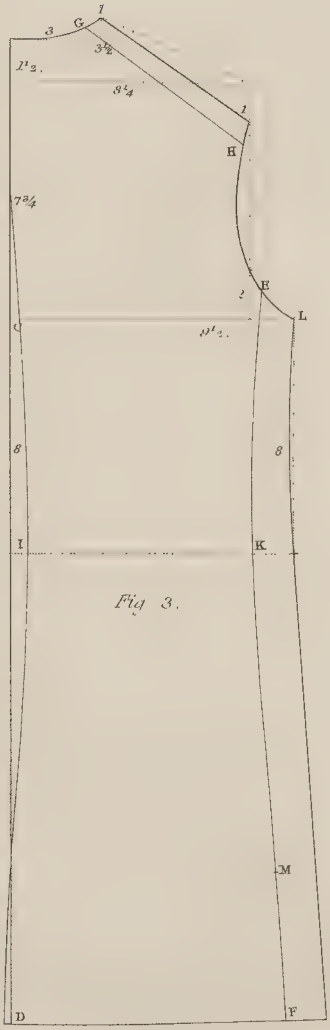


Fig. 3.

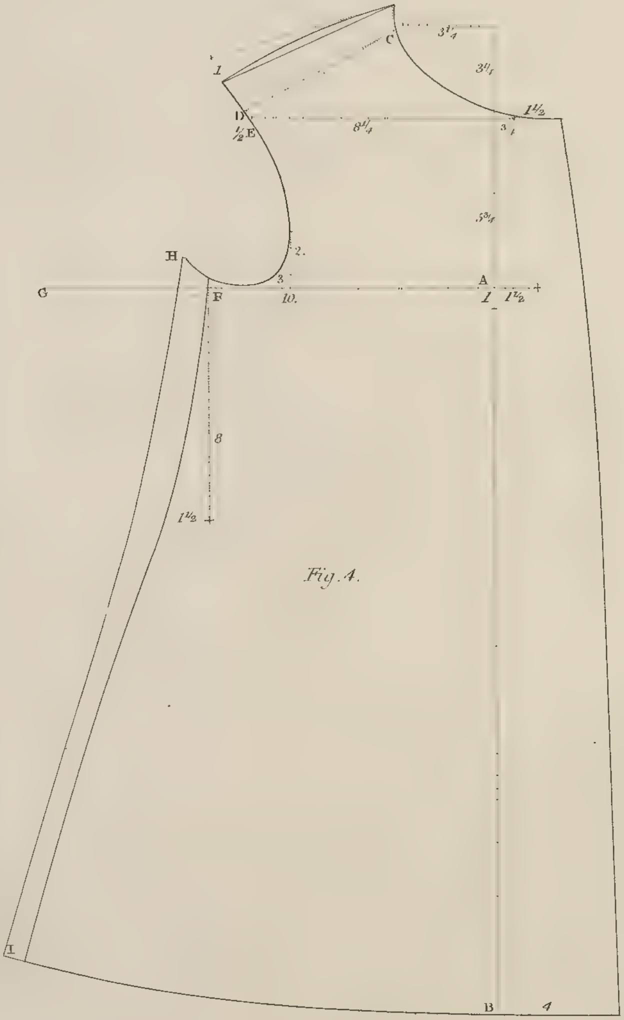


Fig. 4.

Wampen's Models

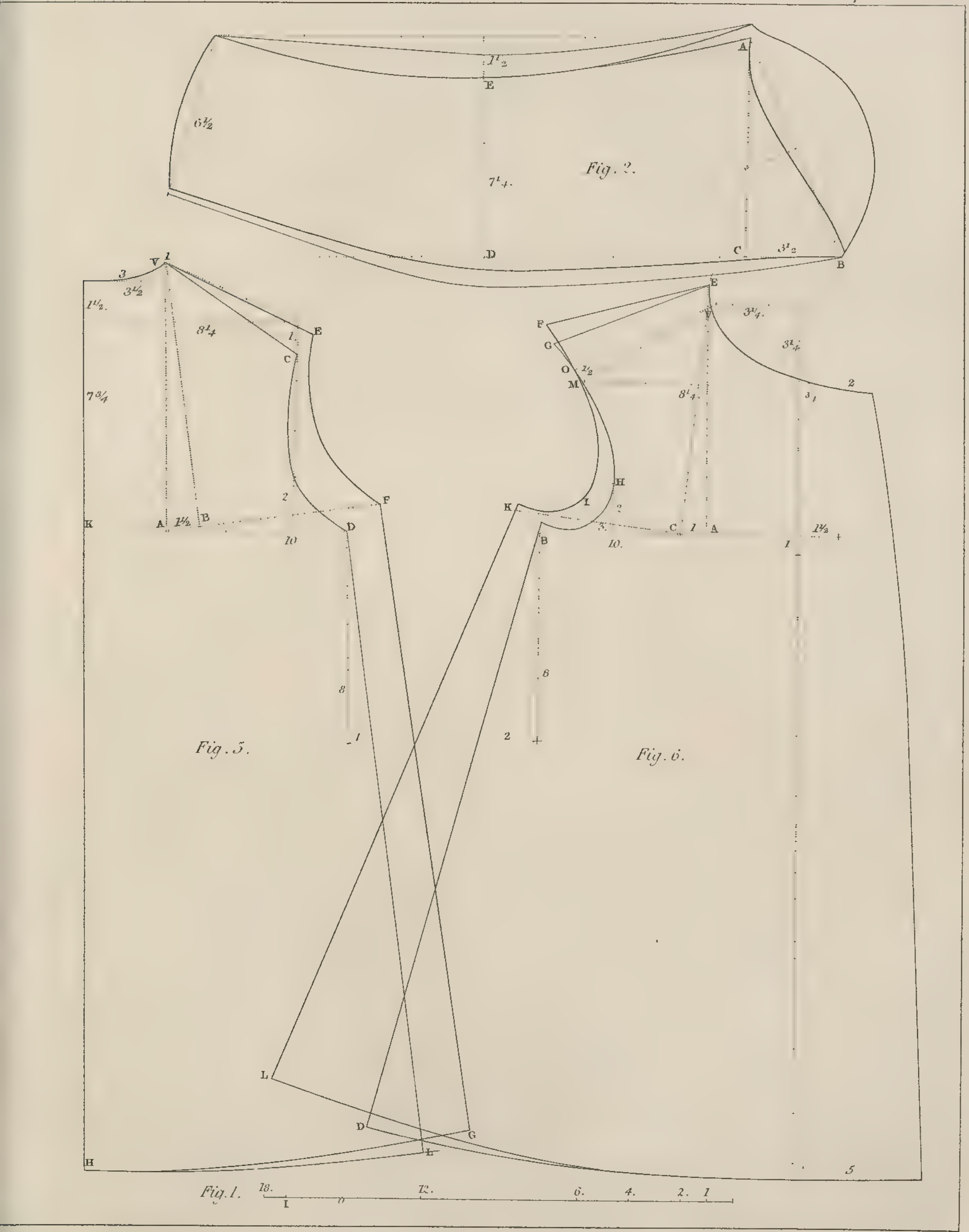


Fig. 2.

Fig. 5.

Fig. 6.

Fig. 1.

J W Lowry sc

Pl. 40.

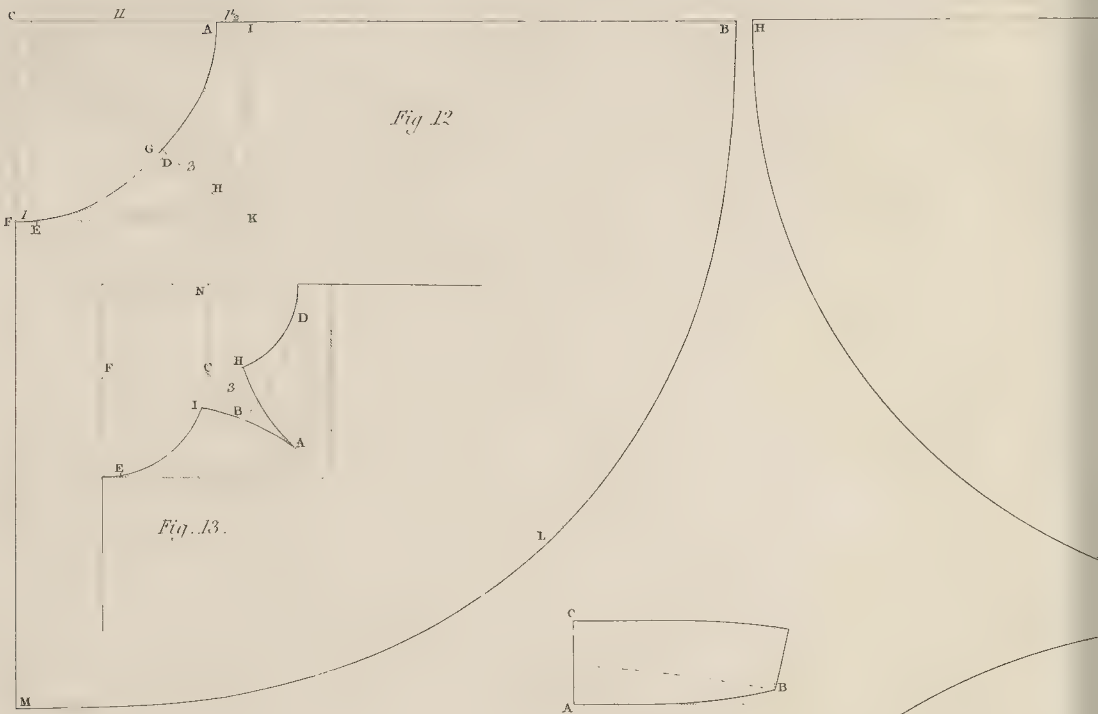


Fig 12

Fig. 13.

Fig. 11.

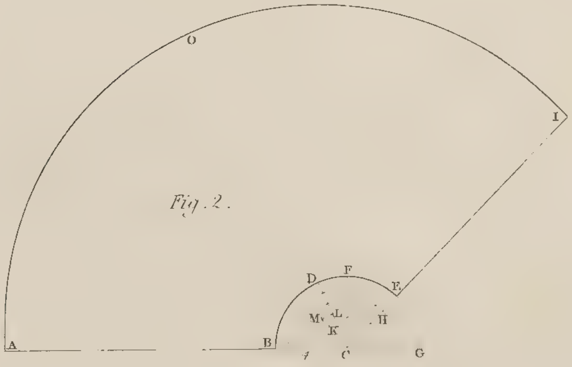


Fig. 2.

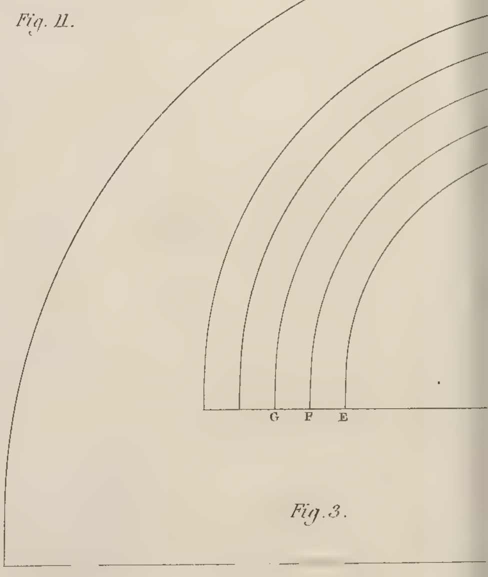


Fig. 3.

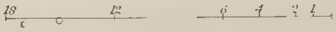


Fig. 1.

Wampen's Models.

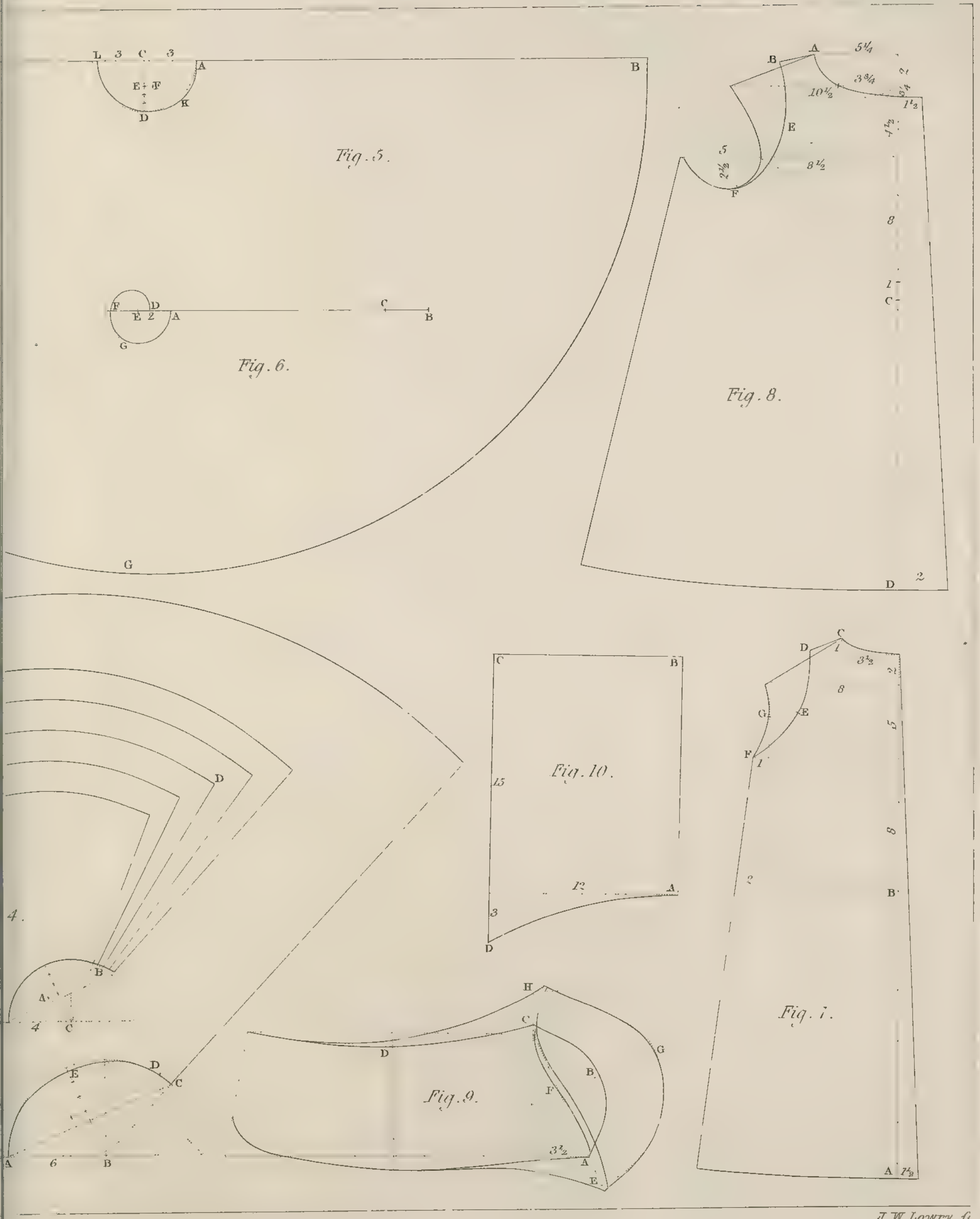


Fig. 5.

Fig. 6.

Fig. 8.

Fig. 10.

Fig. 7.

Fig. 9.

4.

J.W. Lowry f

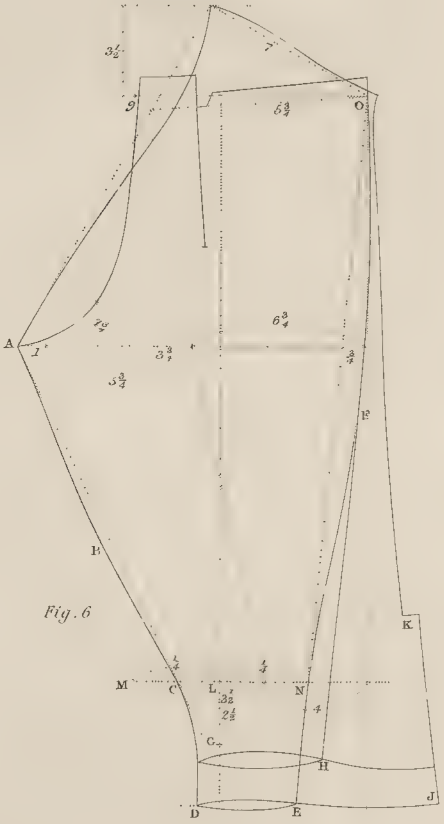


Fig. 6

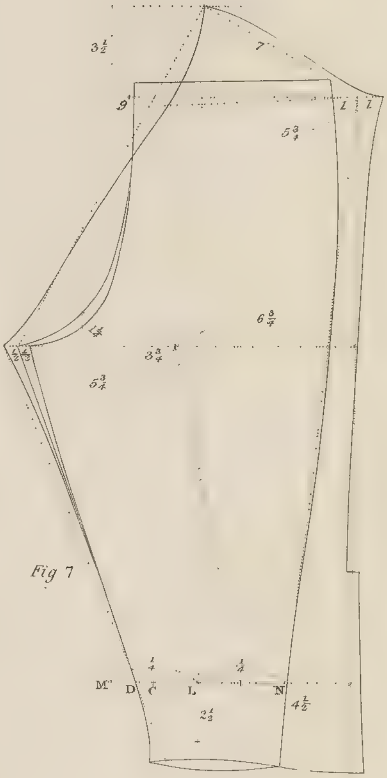


Fig 7

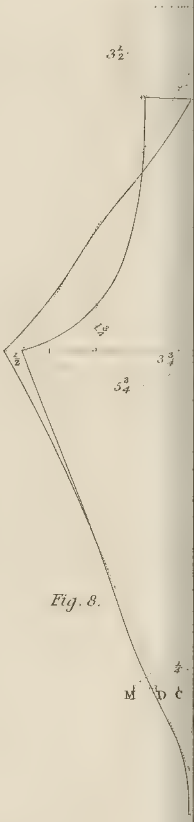


Fig. 8.

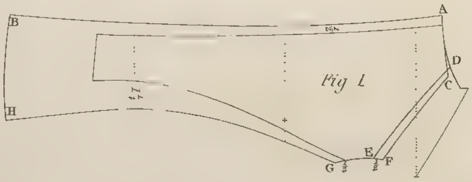


Fig 1

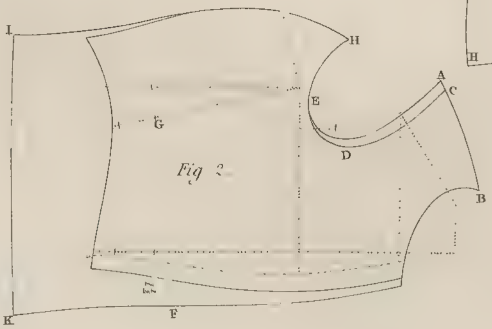


Fig 2

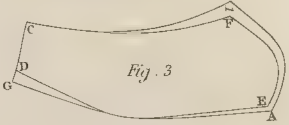


Fig. 3

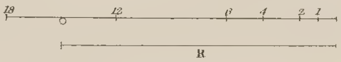
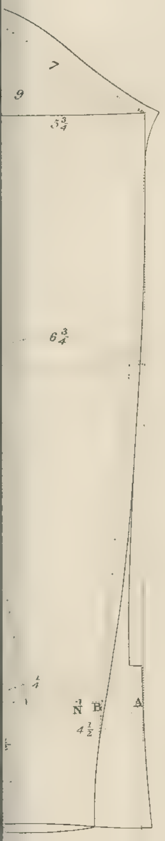


Fig. 4.



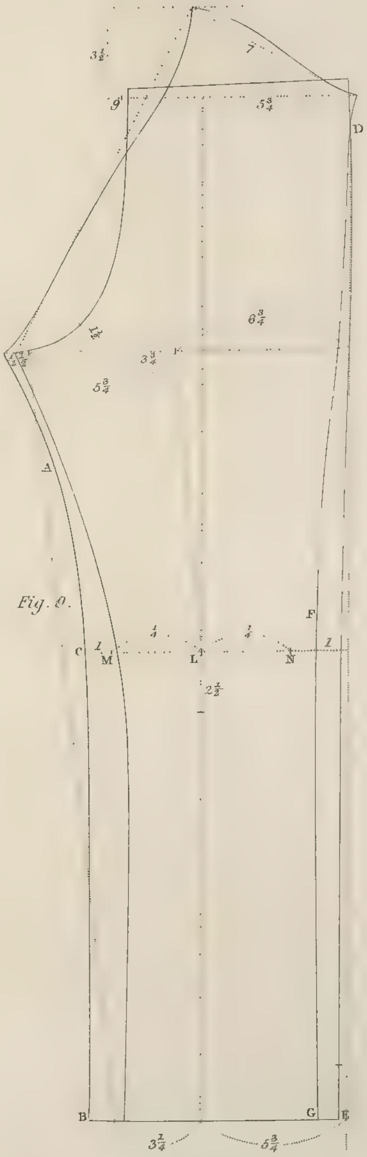


Fig. 9.

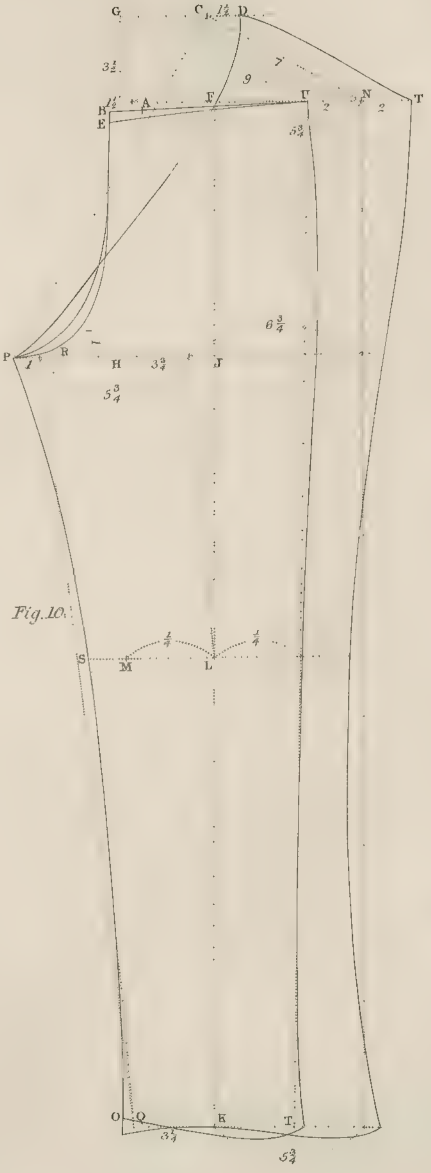


Fig. 10.

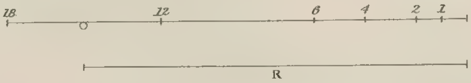


Fig. 5.

J.W. Lowry fc.

Pl. 42.

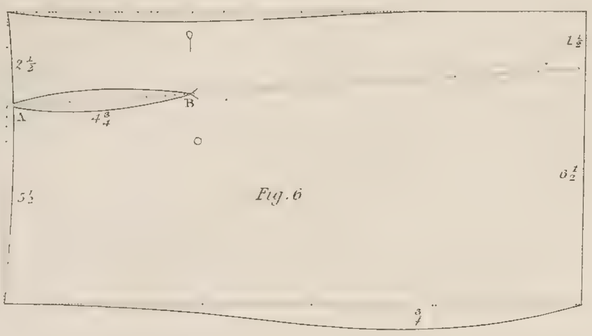


Fig. 6

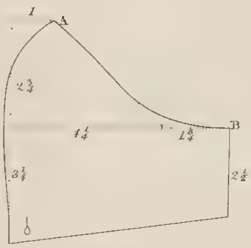


Fig. 5.

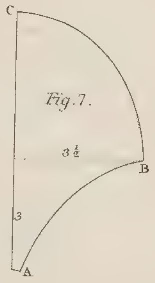


Fig. 7.

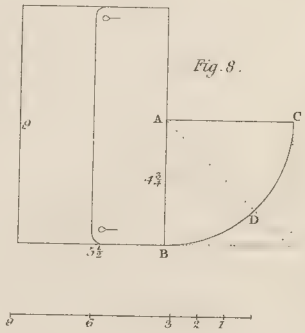


Fig. 8.

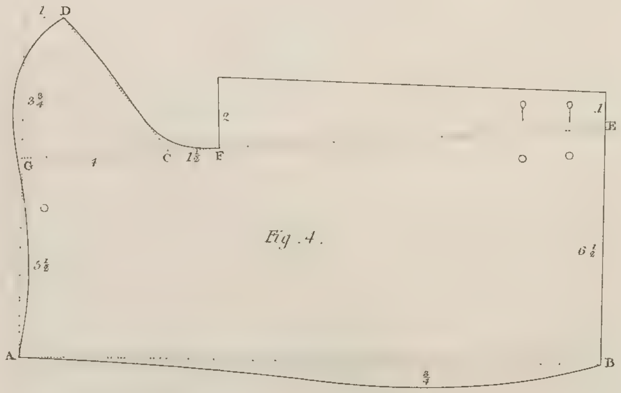


Fig. 4.

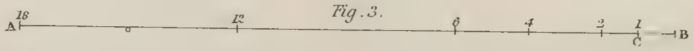


Fig. 3.

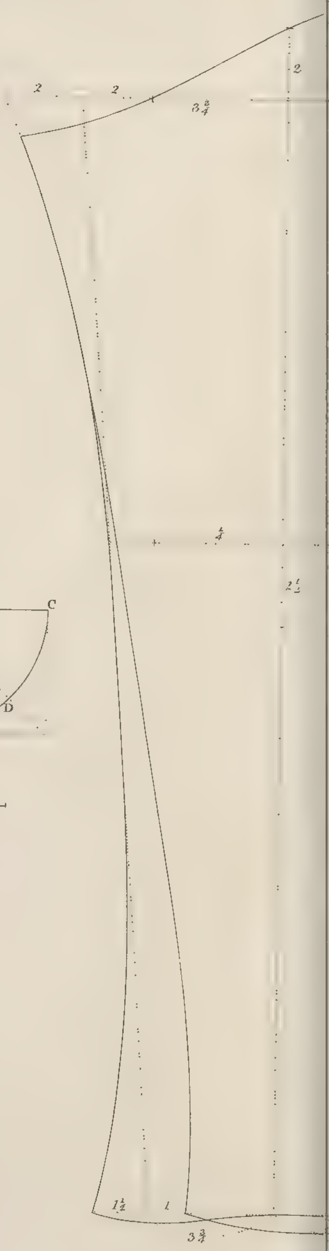
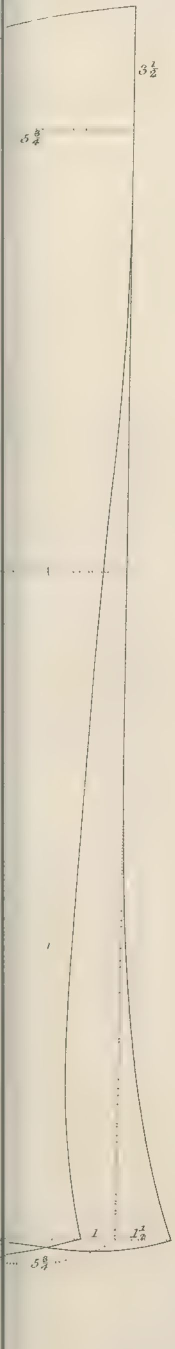


Fig. 13.



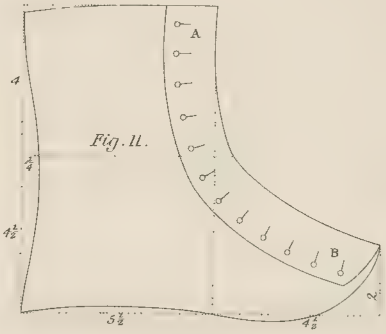


Fig. 11.

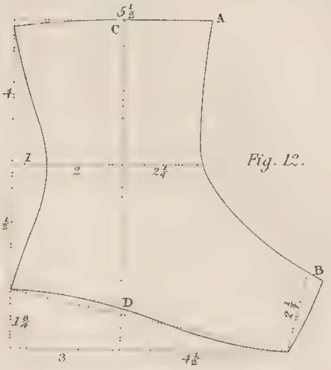
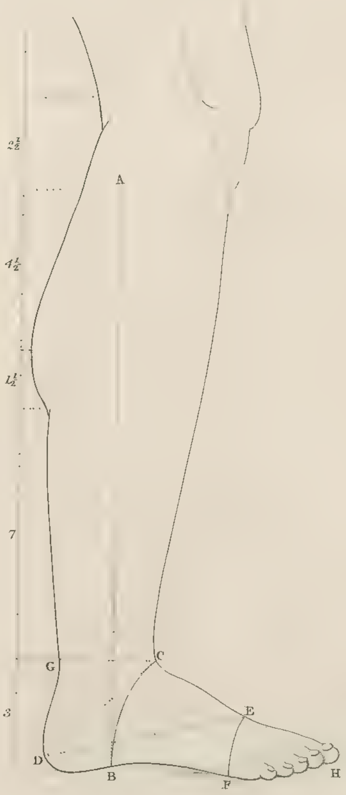


Fig. 12.

Fig. 1.



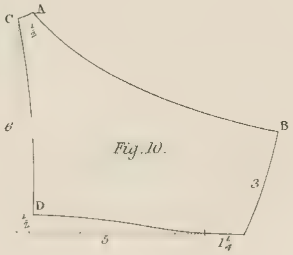


Fig. 10.

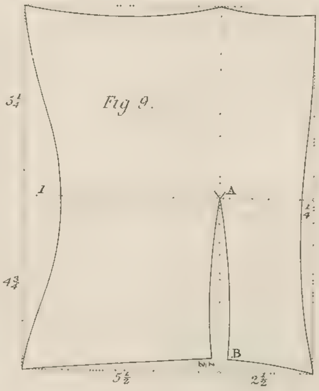


Fig 9.

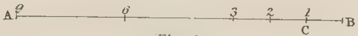


Fig 2

J.W. Lowry fc.

APPENDIX

TO

THE MATHEMATICAL INSTRUCTION

IN

Constructing Models

FOR

DRAPING THE HUMAN FIGURE,

BY

HENRY WAMPEN, Ph. D.

Professor of Mathematics.

THIS Appendix is not designed to be, as the work itself is which it follows, systematically arranged in the matter it contains, which was most necessarily required in a solid and primary instruction; but the ensuing numbers are meant to comprise articles promiscuously brought together, and each article to present the newest, best, and most desirable information which can possibly be obtained in art and science, as to beauty and truth in form, so far as directly connected with draping the human figure, or as kindred to it. It is naturally to be expected that the reader of this part of the work, in order properly to understand and appreciate the contents, will have previously made himself well acquainted with the foregoing volume of systematical instruction. As this Appendix, in the same time that it will present many new designs, gives ample and critical explanations, it will be to the advanced and proficient, in all probability, as interesting as it will be useful.

¶ 1.——Ratios which come to our perception so that they not only please the eye, but in the same time enter our conception and please the mind as well, namely, when belonging to a determined and truly recognised species, they are termed beautiful, and the æsthetical principle is revealed in them. Now, as the human figure is a species of the choicest form, revealing such a principle in the ratios of its integral (geometrical) parts; and further, that drapery connected with that figure must not destroy, but rather show to advantage this form; therefore the ratios of the parts are not less choice, and to be well understood to be made perfectly and correctly. So, for instance, a style of garment which is termed the jacket style, and which has become very generally liked, has its beauty in that, that its parts have such ratios to each other as to correspond to the figure, showing it in the same time, so that not one of its points (geometrical points) are hidden. And although the skirt of a garment is so indifferently spoken and thought of by the unreflecting on the beautiful, there is much in it to be observed, if the true and the beautiful shall be exemplified in a becomingness of the dress (garment) to the figure. If, then, for instance, we bring first in the mind certain proportions of the figure, namely,

16½ the normal length of the waist, which is, if the figure is in every respect normal, the natural length of the waist in the same time;
10 the height of the pelvis;
11½ the length of the thigh, from the pelvis to the middle of the patella.

38 units.

Now, taking the entire length of the garment as 30 units composed out of parts, then as to lengths in connexion with the parts of the figure, we have the formula for a jacket style;

$30 = 16\frac{1}{2} + 10 + 3\frac{1}{2}$, rather longer than the seat, but shorter than to cover the half thigh.
$33 = 16\frac{1}{2} + 10 + 6\frac{1}{2}$. This is longer than covering the half thigh, and becoming for a morning dress.
$36 = 16\frac{1}{2} + 10 + 9\frac{1}{2}$. This is becoming for a frock.
$37 = 16\frac{1}{2} + 10 + 10\frac{1}{2}$. This is suitable for an evening dress.

The greatest number, 37, is here the entire length of the evening dress, and in the real figure we had 38 units to the middle of the patella; and so that the dress does not conceal a point of the figure, or destroy the ratio of its parts, the skirt of the garment falls short by one inch of reaching to the middle of the patella. Here is a certain law: the jacket style is rather longer than to cover the seat; the morning dress rather more than the half thigh; the frock approaches nearer to the knee, but does not cover the thigh so far as in the case of the evening dress, and this last still does not cover the middle of the knee. Such is the law, that even over garments of any style going to the figure, as great coats, &c., if covering more than the middle of the patella, would destroy the ratio conveying the beautiful, and which must be adopted in any other class of garments to bring out the beautiful as in this. However, we will confine ourselves now to the style of garment entered upon, and define the ratios still more distinctly in another form; namely, if we take the normal waist length as a measure, and put it in ratio formula, then

$16\frac{1}{2} : 16\frac{1}{2} - 3$, is jacket.
$16\frac{1}{2} : 16\frac{1}{2} - 0$, morning dress.
$16\frac{1}{2} : 16\frac{1}{2} + 3$, frock.
$16\frac{1}{2} : 16\frac{1}{2} + 4$ or $3\frac{1}{2}$, evening dress.

Presented in another form, it is this:—

$30 = 2 \cdot 16\frac{1}{2} - 3$, jacket.
$33 = 2 \cdot 16\frac{1}{2} - 0$, morning dress.
$36 = 2 \cdot 16\frac{1}{2} + 3$, frock.
$37 = 2 \cdot 16\frac{1}{2} + 4$ or $3\frac{1}{2}$, evening dress.

In fig. 1, Pl. 1, Appendix, is the model of the jacket in $AD = 2 \cdot AB - CD$, which means the length is twice the normal length of the waist ($16\frac{1}{2}$) taking off 3; and in the same fig. 1, $AC = 2 \cdot AB - 0$, that is, to take off nothing for a morning dress.

It is easy in application to put the back with its normal waist length A B upon B C, and deduct from, or add to B C to determine the skirt length. The style length of the waist does not affect the proceeding just described of determining the entire length of the garment; as whatever A B in the style length increases, the skirt length B D in B E decreases, so that it always stands

$$AD = AB + BE + BD - BE;$$

which means A D equals always $AE + ED$, whatever the style length B E may be. But it is especially to be observed that whenever the figure stands flat in the back, deviating from the normal position, the style length B E must be made $\frac{3}{4}$ of an inch shorter than otherwise, and such must be observed also in the entire length of the skirt, especially behind. The reverse is the case if the figure is round backed, deviating in the opposite from its normal position.

Having taken here the normal length of the waist as the measure by which the skirt length is defined; and as the normal length of the waist is in the three different kinds of form in the human figure of different lengths, and that in every model the normal length of the waist is always found before farther proceeding in constructing the model, it is more general and useful in practical application to say:

The skirt length equals always the normal length of the waist
minus 3
„ 0
plus 3
„ 4 or $3\frac{1}{2}$

¶ 2.——As the style of a garment in the direction of the shoulder is very fluctuating, and that by changing one style of form of garment into another, the beautiful may be easily destroyed in the form of the figure, this part of the model calls for equal attention. At present a full or heavy form in dress round the shoulder is preferred, as the hind part of the model fig. 1 clearly presents, and that especially in the jacket style of garment. For this reason then the increments are made in those co-ordinates which will affect the desired fulness in this locality; namely, instead of 3 the $AF = 3\frac{1}{2}$, instead of $7\frac{3}{4}$ the $HG = 8\frac{1}{4}$, and instead of 7 the $HK = 7\frac{1}{2}$; also the breadth of the style in the hind part is instead of 7 increased as much as a half or even upwards. But this would not suffice to produce the effect desired if the forepart of the model were not brought in consideration. We must first then bring to remembrance that a great fulness in a garment in the shoulder of the figure causes that garment to fall and so destroys the correct proportions of the figure by adding fulness of material where it is not desired. For that reason a mechanical contrivance is necessary in the construction of the model in the forepart to counteract the destructive effect and maintain instead the correctness of the proportion by keeping the fulness in its appropriate place round the shoulder and with that retaining the beautiful in the figure. This will be effected by making, fig. 2, the $AB = \frac{1}{2}$ and placing the line AC in the position BD. In this manner there is a decrease in D produced corresponding to the increase in the hindpart, and in HK; namely to effect a power in holding the garment on to the figure. In respect to the style and correctness of the size of the waist in the front suitable to this style of garment in the looseness round the shoulder, there must be added, as FE shows, fully one inch to the given size of the figure.

It is from the foregoing explanation perfectly clear that the skirt, fig. 3, belongs to the jacket, and fig. 4 to the morning dress. They are full and forward in the front so as to be in keeping with the other parts of the model.

The sleeve part of the model fig. 5, and the proportion measure fig. 6, need no further explanation than that the former is as presented in keeping with the other parts of the model.

There is a second style of garment presented in the model fig. 7, and to which also the measure fig. 6 and the parts fig. 1 and fig. 5 belong. This model fig. 7 is exactly treated in the shoulder of the forepart as has been described in fig. 2, and is therefore much the same in style, only having the exceptions of a little difference in the front, and that there must be no section in FG. But in this model it must be particularly observed that the scapula line HI must run in a straight line with IK, and be made so that $HI = 5$, instead of $4\frac{1}{2}$; and further that $INLM$ must be taken out in such a manner that the sections touch the points N and M in the pointed line, in the half from the point of the fovea axilaris I and the iliac point. After the side part is properly closed in the points M and N with the forepart, the scapula point H with the side part HI will take the same position as the corresponding point and side part in fig. 2. Still in the entire a different style is produced in the model fig. 7 to that of fig. 2, and therefore the garment produced after that model will be more different in style (but both beautiful) than will at first appear. But in both attention must be equally given to the length of the skirt.

In this same style of the shoulder in the hind part and fulness of skirt are also the over coat models constructed; with the exception that the length of the skirt reaches nearly to the knee or to the middle of the knee (patella), but not longer if beauty shall be preserved in the figure. It is naturally evident that a model for a great coat must be in other respects exactly constructed by the rule for constructing models for over garments going to the figure as laid down in the previous work.

¶ 3.——There is a garment worn under the name of Spanish sleeve cloak, a modern substitute for the regular old Spanish cloak, see the model fig. 8. This is much liked, but garments of such a character being of necessity ample in their quantity of material can never come into general adoption in a country where the climate is heavy and oppressive, and the occupation of the people unsuited to it. As to the suitability in this garment it must well cover the knee, otherwise it will not be becoming to the figure, for it must be borne in mind that that class of drapery which has in its form an approach to the character of cloak, from its fulness, will never be becoming unless the skirt is rather long. In the real clothing of the human figure it is very difficult if the beautiful shall be maintained to combine the conventional with the antique; the necessary utility of the dress sets the artist a boundary. In painting and sculpture there is more freedom and play of imagination, and as a case in point we may instance the statue of Sir R. Peel at Tamworth, as an extremely happy and beautiful union of the conventional with the antique. In respect to the drapery the statue is a modern classic.

The construction of the model (fig. 8.) for the sleeve cloak is so simple, and as the proportion numbers accompany the co-ordinates, it needs no further explanation; still it may be said that $ab + bc = 10$ inches, and $ec = 1$, is meant for the step folding over in fastening. The triangle-like wedge is folded together and makes the small piece in *b*. The square formed wedge is to go in A between the sleeve and skirt. The collar is 10 inches long. The measure placed beneath the model is taken so small merely for convenience; the scale is 1 unit equal to $\frac{1}{8}$ of an inch.

The next article is simply one of utility, and especially one of comfort. It is the case that females of every rank and station are often anxious to possess a model, (if not scientifically constructed a pattern) of a pair of comfortably fitting drawers. This is then complied with willingly, as there is not the slightest difficulty in constructing the model; for as the comfortableness depends on the correctness of the drawers, the correctness of the model depends on the proportions of the figure being correctly implied in its construction. Now as the measure of the size of the figure can be given, and the proportions are previously known, it is only needful to mention that fig. 9 is the given measure as the foregoing work of instruction has shown; namely A B is the breast measure, and A *a* is the bosom difference. Suppose the size of the breast measure is 15 inches, but known always as 16 units; the size of the waist is equal to 12 inches, in this instance to *o* B. Further it is known from the proportions of the figure that the circumference of the pelvial section is equal to 19 units; and then E D + D C must be made equal to 19 units + 2 units without seam, which must be allowed for (see fig. 10). This model may also be made use of for a pair of lady's riding trousers; if so, then the seat part of the model must be placed according to F G; make K F = I G = 2 units, and draw the lines F C and G H instead of H I and K C. The sizes L M; O P and the lengths H M; H O of the parts for the leg may be made quite at liberty and convenience. But this model is constructed for a proportionate figure, and the student will understand from the construction of trousers models for a male form how to proceed with those for other female forms also. Although it is for merely a proportionate form, the model may be used for the broad and slender female forms, if the leg and thigh is shortened in the one case and lengthened in the other, and so done that the parts under the proportion numbers are shortened and lengthened in due proportion. The construction of the model is by itself evident as the proportion numbers are given on the co-ordinates of its parts.

¶ 5.——In concluding this article we may glance at the question—whether in a college of design for industrial purposes the human figure should be studied or not? *not* is concluded by some who confine their mental eye to too small a sphere when they think or speak so. But if we consider that the decorative art, taken in its most extended sphere, in industrial parts, is to be cultivated in such an establishment; and that first the human figure gives us the choicest of forms, containing all the primary elements as to form for design; secondly, that the art of draping the real figure artistically is impossible without the study of the human figure; and further, that this art is certainly not less an industrial branch than any branch of the decorative arts, and that such art is even by many put under the head of decoration; then indeed it appears that the idea of excluding the study of the human figure from the school of design in question, must have been uttered under a great error.

To sink in nought all those members of the community who are engaged in the art of draping the real figure, is not possible, and to exclude them from such an institution would be unjust. This art does exist now as a scientific, cultivated and developed art, and it has existed, though until lately, in a rather primitive state before many others. For the reason then that the commencement is made to blend it with science, it must and will naturally keep in the path of progress with other arts, and there will always be found minds sufficiently enlightened to let it not remain behind. Where then, to get rid of the human figure from an industrial college of design shall the art of draping the real figure have its place, as it cannot be separated from the study of the human figure, and can neither be taken away from under the head of industrial arts, even if we would argue it away from the head of Decorative Arts?

By way of comparison, as the decorative art is more than mere ornament, so the art of draping the real figure is more than mere decoration; just so as the fine arts are again more than decoration, ornament and draping the human figure only, although artistically done. But however much we may endeavour to sever and exclude one art from another there is for reflecting minds a brilliant thread which through all is continually striving to become visible in nature and art. This thread is the æsthetical principle or the beautiful. It is not an ornament, it is not a decoration, neither is it a mere utility; but it is the ratio which so defines the parts of simplicity and fitness in variety and contrast in recognised species in their kinds of form, as to arrest and hold fast our nobler senses, and force us to admiration. And this universal chain being established in nature, in the subject to perceive, and in the object to convey will never allow that man should be severed from his fellow man wherever the cultivation of taste and the beautiful in any art whatever is the subject of consideration. Far more may be said in favour of the art of draping the real figure, in giving it its right place, and this in respect to its utility in the fine arts, of which it would then become a part. But as utility is a prominent feature in it, also in the decorative arts, and that in the character of its utility it falls to the head of industrial arts, we will leave it here, satisfied to perfect it under this head in beauty and truth, the common chain of all arts.

If certain branches of the industrial arts *shall* be excluded from such a college, which, as its term specifies, includes all industrial branches, why not more correctly narrow the sphere of the term and suit it to one implying what arts shall be cultivated and instructed. Undoubtedly names for it are not deficient, and curtailing the base of instruction, excluding, and specialising certain men and their arts to isolation the time does not desire, as a free and unlimited communication of the interchange of thought, to one great end, advancement and perfection are striven for. But what otherwise can be the result of isolation and exclusion than to contract the mind, produce self-conceit, over-rate one's own cherished opinion and sneer at others however profoundly learned? So for instance the instruction of youth is often confined under the term of religious instruction to merely prayer and worshipping, while the material base, science, for useful life and self-maintenance is left for nothing, as if the true, the good, and the beautiful were not revealed in art and science, and could not raise the industrial student by the very nature of his studies up to a moral being in real action. Further, private instruction, if the professor is a highly learned man, and skilful in conveying information to his pupil is perhaps the best and most advantageous; because, all attention in the course of instruction can be more fully and precisely bestowed on the pupil; and still such is not free from isolation and exclusion. In this mode, although but a few in number can receive a good instruction, it is attended by one great benefit; that is, private instruction is directly communicated, inasmuch as learned and energetic men carry their methods and discoveries in art and science from one country to another. Through this individual minds become awakened and expanded, though not in great numbers, long before such could be effected from the chair of a professor in a college. Colleges do the same for a great number which private instruction does for a small number. Again just so as an isolated college for especial art and science is based upon a wider communication of instruction than a private source, even is it narrow and exclusive in comparison to an university, or a school of colleges for special branches of learning, where not a single branch in any art or science is excluded, and all instructors and instructed stand in communication. Here is neither isolation nor exclusion, the mental lamp burns with the brightness of the meridian sun. Opposite to this where colleges and the people stand exclusive and detached, how narrow mindedly scoffs one at the other; from mere ignorance and short-sightedness they are unable to value each others' branch of learning, and with this unable to respect each other. This is lamentably worse between the scientific and practical classes of men, and all arising from the same source.

There is another topic allied so closely to the question under consideration, that it cannot be fairly excluded here, namely, the well-known recommendation, "Teach you one another," which means, have no scientific men professionally to instruct in the science of the arts, especially not in the industrial arts. "Teach you one another," was the reiterated cry. Certainly, this is the mode suitable to a rude state of society, and where an art is in a most primitive and undeveloped condition, as at present the shoe and bootmaking art mostly is, where theory has not developed itself from practice, and the combination of science with art is not yet thought of; but in a more advanced state of society, where art and science are developed, and each branch and its division are under the highest cultivation, assisting one another to the end of perfection, then, indeed, such a method leads to destruction; because it fetters the development of art and science, making a bungle of the practice, as the practical man has not time to study, to theorise, and practise well, all in the same period. In spite of this evidence, "Teach you one another" has been persistingly recommended to practical men, but done so with the view that such teaching should be generously given, without pecuniary reward; because, they say, you are persons all of the same rank, as practicians in an industrial art, though you differ as masters and men. And really many practical men in trade caught this hint; as a sufficient number of them have been found to assume, with a very kind and benevolent air, the mastership of an instruction in the scientific theory of their respective arts, though, in fact, they remain as teachers, and never rise to be instructors. As to the pecuniary reward, and benevolence of their unproficient teaching, higher prices are demanded and paid than if the pupil were under the private instruction of a scientific man who is an instructor by profession. And further, with reluctance it is said, as they find that copper will be taken for gold, and that they can allure their brethren so well and so profitably, the direction to teach one another has been made a principle merely for gain, and a road to confusion and obscurity in those arts in which this principle is mostly carried out. This is the true cause that science is in reality so much excluded from the industrial arts, and its light not admitted among the great body of practical men, and therefore it shines only in the minds of a few noble individuals of them.

With this neglect of science their entire body has sunk, though the aim is their elevation. They have reversed the noble sentence of Göethe—

" Noch etwas licht lass mir herein ; "

(" Some more light let in for me ;") and turned it into " Let in but barely light for me," for others may see that beam of light if it flows too broadly. It is not an excuse for a practical man to make, that time will not allow him to instruct scientifically,—as a scientific man does, that he cannot give all his time to his pupils,—and that he must look after his trade and customers, which is far more profitable than teaching. Most certainly we agree with him in this, as it is the real truth. But he has no necessity to combine the profession of an instructor with the carrying on of a trade at the same time, in the end (as is invariably the case) becoming a bungler in both. Whoever designs to be an instructor, let him give up his trade, and study in the science of the art of which he will become a professor, and then *be one*, with all his mind and vigour, to promote and not retard the great end, perfection.

Look over every branch of industrial arts, in fact, all arts that have ever been left in all their parts to the accomplishment of one individual. Never was progress here. It is only after a scientific theory of an art has been cultivated, and professionally instructed by a scientific man, that the community has felt the benefit of it, in the introduction of superior articles produced by the practical man.

Some practical men, of inferior standing, will even assure us they teach equally well the same theory and science, or system, as the scientific man. To this we say,—no, you give to your pupils the mere soulless body of that which the scientific man gives. The spirit, that very vital principle which must animate the pupil, and make him a composer and designer from his own clear conception of the scientific principle of his art, you fail to give ; and, what is worse, you make him a mere blind follower and copyist. This self-thinking spirit is the very thing which the pupil stands in need of most,—more than merely to follow where he is led. Still such a mistaken proceeding is in some degree pardonable, as such may be partly done in ignorance ; but, worse than this, the pupil is deceived by being told that he shall learn the practice in the time that he is learning the scientific theory of the art. In the meanwhile, you know that nobody can be taught practice, nor learn it, as it is but the practical theory of an art, not the practice, which can be said to be learned ; and further, a man can only gain practical facility, or become a practician, through his own application and personal practice in an establishment, if he, previous to this, has been made proficient in the scientific theory of his art, which in truth you do not, will not, and cannot do. If you, then, confine yourself to that part, and receive a commencer into your establishment, allowing him to practise in it, and then take a reward for the benefit given to him, we would say you did correctly and what ought to be done, as some really of the higher classes of practical men do, leaving the instruction in the scientific theory of the art to men whose profession it is, with whom they are always in good understanding, who give up all exclusion and isolation, all retardation, and between whom exists a mutual feeling of respect ; doing this we shall not fail to gain the great end of perfection in every art. Let us never forget Dr. Whewell's golden saying, " We are all fellow-students in the great Industrial University."

ITALIAN CAPE MODEL.

¶ 5.——There has perhaps never been a loose over garment introduced into England so much liked by gentlemen as the Italian Cape, a model of which is presented under fig. 1, Pl. 2, App.: and most true it is, that this form of garment on the figure is really elegant. It appears to have a sleeve, but in reality it has none, and what seems to be one is a mere indication of it, accomplished by a suitable section in B K L M, as defined by M, by L, K and B. Its length behind is in G I to the middle of the thigh, and of a corresponding length in the front F. But on the side in the part C A B defining the width of the sleeve, the model presents it D A = 4 units shorter than the primitive circle E C D B F defines; so that it shall not be too long upon the hand.

The construction of this model is in its original and first proceeding as given in paragraph 93 of the work under fig. 2, Pl. 40, and therefore it is only needful to mention here the difference between this model and the other described in that paragraph. After the circle E C D B F is drawn, erect in the centre H a vertical line H D; make O P = 5¾; P Q = 1, and draw O Q in continuation of F; erect in P a perpendicular P K = 7 units; make B R = 12½. After this erect in G a perpendicular G M, and continue H S until it meets G M in M. Draw the curve K L M and sect the model in the line B K L M; hold the sleeve part T on full in the shoulder part L, which will shorten K B, but in order that B meets U make U B = 1, and draw the curve U R out by free hand. Make farther D C = D B. After the line B A C is drawn out by free hand make E I = 2 units, and draw the curve C I out by free hand harmoniously. The lappel in the front may be made at liberty, so broad as to suit a single or double-breasted style as may be required.

The collar part, fig. 2, of this model, will be a little broader than it is usually made for other garments, but which the proportion numbers accompanying it sufficiently indicate.

The proportion measure beneath, fig. 3, is the same as that already understood. But it may not be superfluous to repeat that such must be considered as 1 unit larger than that by which the frock model is constructed for a figure of the same size; namely, if A B were for a frock in size equal 18 inches, then for a loose over garment model A B must be equal to 19 inches.

MENTAL GEOMETRY IN FINE ARTS.

¶ 6.——If there is an art generally useful and practicable it is that of free hand outline drawing; some term it drawing by the eye; but more correctly it ought to be termed free hand drawing by eye measurement. As a fine art unfettered free hand drawing in presenting forms of objects despises all measures and measuring with instruments; and this might be admitted were the object so small that the eye would be able to measure the entire which shall be presented, and if size need not to be defined, though in presenting objects in rough outline, there are allowed many mechanical contrivances of one and another description. Dismissing the larger objects with all that belong to them from the mind, and holding fast only the smaller whose forms the eye can clearly and distinctly measure, we still could not present a single object without a mental geometry recognised by measuring with the eye. As, for instance, the artist would draw by free hand a rose leaf; at once from recollection or from present measurement by the eye, he sees mentally the ratio of the leaf in the breadth to its length, namely, (fig. 4) that A B in relation to C D is nearly as broad as it is long. If the artist would present a lily leaf his mind immediately recognises the ratio of its breadth to its length, and he draws the leaf by guiding the hand with the mind to the breadth A B in relation to the length C D (fig. 5). This perception of ratio, length to breadth, length to circumference and position of parts or of parts to one another, measured by the eye and carried by the mind is the mental geometry in fine art, and worthy to be cultivated. Without such a mental geometry the artist would not be able to distinguish the form and position of one object from another, not the rose leaf from the lily leaf, still less represent it again through his mind, which he must do, if he will present objects artistically, and deserve the name of artist. Without a mental geometry the artist could still less decide between forms of one and the same species; as, for instance, there are on a rose-tree many leaves, some differing in form as in breadth to length; so by the lily. And there are other objects in their own species differing in kind of form expressed in ratio, as in height to circumference or breadth; as, for instance, in forms in the species of man; forms in the species of dogs, horses, &c. &c. Mental geometry in the fine arts appears then to be the knowledge of all the forms of objects in space, carried by the measuring of the eye into the mind, and the distinguishing of kinds of forms in one and the same species is a knowledge which the mind receives of the difference of their ratios of dimension, and the position of the parts to one another. From our knowledge of the form and position of an object in space (mental geometry) we may be assisted, if carried in our recollection in free hand drawing, to present objects in correct outline; and as long as the idea is left free and unfettered, as to what shall be presented belonging purely to the real of fine art, mental geometry is sufficient. But if free hand drawing is applied to an industrial art of which the base is science, and the parts of it fine art, undefined or mental geometry is not sufficient for the scientific portion, different ratios expressed by proportion numbers being required. Still going too far the other way, to demand a drawing of those parts by geometrical lines, which can be done better by free hand drawing with the assistance of mental geometry, would be to excess and therefore incorrect. Each part will only harmonise with what is homogeneous to it, for that reason nothing must infringe upon the other rights, though the parts themselves may be happily joined.

STAGES OF MODELLING FOR DRAPING THE REAL FIGURE.

¶ 7 (*a*).——There has been a time when the art of presenting a model for draping the real figure consisted in doing it by free hand drawing. The artist though took a scanty measure from the length of the garment and the length and breadth of the figure, and took the form of the figure, more important to him, in the mind by measuring it with the eye. This mental geometry of the figure by great exercise he fixed so truly in his recollection, that whenever he placed the measure on a plane or sheet of paper, the form of the figure in dimension and position was the unfailing result, in case however it was proportionate. Such a free hand drawing may be presented under fig. 6, Pl. 2, App.: the geometry of it is presented under fig. 7, where the line A B gives the length of the entire model, and the length A C only a part, namely, the length of the leg. The other lines presented under D, E, F, denote the breadth, and the position in which they are placed denotes the form of position in the parts of the model. The points in the ends of these lines considered in relation to each other, are the geometrical points which the mind, assisted by the eye, holds fast to aid the hand in presenting a form by free hand drawing. But the various forms of the human figure and the changes of style in different countries, and variety of costumes in dress, made it difficult to escape committing faults when the fit and suitableness of the garment should not be neglected. It was therefore necessary that the mind should be exercised to find a more definite and sure connection between the model and the figure; and after it was found that the half circumference of the pelvis of the figure, divided into eighteen parts, termed units, and that with thirteen of these units and the height of the pelvis, a right angle might be constructed, which must be unvaried and fixed in every model for trousers, the second step was gained towards greater power in drawing and constructing models with more certainty than in free hand drawing alone, and a geometrical drawing was thus originated.

(*b*) The figs. 8, 9, and 10 present three small models which may illustrate the description just given. They may easily be constructed by any proportion measure, if it is equal to the half size of the pelvial circumference. The right angled parallelograms A B C D and E B G F are always constant quantities, and, as a diameter in a circle, remain unchanged whatever variation may go on with the model referred to them. So is $A B = 13$ and D B equal to the height of pelvis, always combined under right angles, an unchanged parallelogram; and $E B = 9$, and B G equal height of pelvis plus length of leg combined under a right angle, is a second right angled parallelogram unchanged. This is the place to observe that the centre of the heel H in the model does not in every case lie equally distant from the point F of the parallelogram, namely, F H of fig. 8 is greater than F H in fig. 10; and F H of fig. 9 less than F H of fig. 10; because the position of the leg K I depends on the circumstance of suiting the model to the kind of garment desired. The fit will be correct in all these different positions of the leg, though the style of the garment will be different.

There is one more point which must be understood respecting the centre of the heel, namely, if the model should be so constructed that the three points L, E, C, of it are changed in their position, as for instance that E is placed nearer to A, and L nearer to B, and F E nearer to C, but done in such an order that C D as well as E B + B L remain unchanged in size; then if this takes place the centre of the heel in the model will change also. This may be best illustrated by fig. 11. Think for instance that A B C D is a cylinder, C D G L an inverted conic frustum, both figures joined in C D. From the cylinder part of the fig. 11 take off an ungula by a section C F E inclined to the base. Now think an axis K I common to both parts in the figure; and then think the whole surface F B E C G H L horizontally revolving round the fixed leg axis K I; it then is clearly visible that the heel H in the model will be removed from its original position. And as the axis K I, with the real leg of the figure, is fixed, the centre of the heel in the figure will not farther coincide with the centre of heel in the model.

From these two facts it will be seen that if the centre of the heel in the model shall remain unaltered, and coincide with the centre of the heel in the figure, the model must have a fixed position in its horizontal as well as vertical direction; and that if changes take place here, there must also be made a change in the centre of the heel accordingly, in order to find again the correct centre of the heel in the model, coinciding with the centre of the heel in the leg of the figure.

(*c*) The third stage of modelling for draping is not alone to connect the fine art principle with the industrial technic, but to base it as well more intimately upon scientific principle; which means to bring it in closer connection with that science termed the geometry of the human figure, keeping in the same time as closely as possible in mathematical method, without neglecting the free hand drawing of those curves which can be drawn more easily for practice and for exercising taste in the æsthetical principle than by drawing the same curve after geometrical laws. This may be best illustrated by the fig. 12, Pl. 2, App.

We may think for instance a leg C A H, and the pelvial axis F D, remembering from the development in Anthropometry (Geometry of the human figure) that A B = G C, and that B E = D C; and

as $GC = 5\frac{3}{4}$ and
$DC = \frac{1}{2}$

Therefore is $GC + DC = 6\frac{1}{4}$; and for that reason must also be

$$AB + BE = 6\frac{1}{4}$$

The point E is also a true and fixed point in the pelvial parallelogram. Similarly was the point I found as correct, and after the height of the pelvis E K was given, the iliac point L was found correct, in the developments from the pelvis. The fixed right angle E K L M is again applied. The fixed points L and E are to be here, as well as before strictly attended to; also a third point H, that of the leg, in relation to E and L must be neither disregarded; then in whatever way the model is drawn or constructed, three points must be fixed; the hip (iliac) point, the stride (coxygis), and the heel point.

It is of consequence to remember from the developments that the real figure after a close measure in the line E L is $1\frac{1}{2}$ less than E L in the model; and for that reason if the nett measure were taken from figure in the diagonal direction E L and then placed in this same direction upon the model, such diagonal measure must be $1\frac{1}{2}$ units shorter than the model E L.

Simplified for practical purpose fig. 13 presents a corresponding model, and this will illustrate in the same time if compared with former productions in this work, what innumerable ways there are to construct models when the scientific foundation of an industrial technic is well understood.

In a similar manner as in figs. 8, 9, and 10, the fixed point F is kept for a guide to the position of the leg in the model, the point H in figs. 12 and 13 is best to be kept fixed, although it may be varied as fig. 14 illustrates, where H may be made to take the place of 'H or H', and then from either of these points out, the breadth of the heel equal to 3¼ may be set off. This figure 14 illustrates in the same time another mode of procedure in constructing the model, namely make A B = 13½ units, the height of the pelvis 9 will, united with 13½ under right angles, produce a parallelogram A K G B. Halve A B in C, and make C E = 5¾, and C D = 5¾, then is A D = 1 and also E B = 1. That it is not incorrect when in this case A B = 13½, instead of as in the other models, 13, will become clear if we see fig. 13, where E B = E F; where we take from the entire just as much as was added the entire must remain unaltered.

There is another point worthy of remark, namely that in fig. 14, E may be varied into F, when in the same time also G must be varied into I. This variation gives more ease in the seat and stride, still any superfluous quantity in this direction is neither recommendable, the best is its proper proportion; but if such variation is made, E F = ½, and G I = ½ is sufficient, ¼ is the quantity oftener taken.

Which is the best line to choose of all in the model as a fixed one for guiding the position of the leg, F E in figs. 8, 9, and 10, or A H; H C in the model, figs. 12, 13, and 14, or still any other fixed line? This is perfectly optional. As the chief object is to have one fixed point H to regulate the heel of the model in fixing its position to the other two points, hip and stride. Another very suitable line for this purpose would be E F see fig. 15, if the pelvial axis E F were continued as F D; or, as some may prefer, if its corresponding line E′ D′ in the surface of the model were taken instead.

The young student will from this easily see that, taking a single element by itself in a complexion of lines or points, it is of no value or importance whether such element is a centre line of the leg or any other line, unless taken in connection with the rest of the elements necessary in such a complexion. The part of the model fig. 14 is constructed from the small proportion measure fig. 16; and the models figs. 12 and 13 are constructed by that presented under fig. 17.

¶ 8 (*a*)——Having now described the three stages of modelling for the trouser garments, it needs only to be said that the same which is affirmed of this in respect to the perfection of the art of modelling for draping the real figure is also true of all other garments. And strange it is to say that some masters are yet only in the first and primary stage of the art; many in the secondary, and only a few have arrived at the highest. Living more by the name of the established house to which they succeed than on their own merit in the art, they not seldom harm the young students who follow their advice, thinking that they must do so from the respectability of their authority. So unsound are the ideas of these respectably acknowledged men that they condemn spending anything on artistic or scientific instruction. Here is the truth exemplified that the smaller the diameter of light the less is the circumference where darkness is perceived. But they may see so far, if they only consider how much the *learned* professionalist must spend to qualify himself, and how little, in the majority of cases get in return, compared with them whose outlay is so trifling, or nothing even for learning, and who receive so much. If the manufacturing tradesmen would think of this, he certainly would not consider every expense for learning to be too much, but rather progress with the time, and render more justice to the consumer for that amount of material benefit which is turned over for him to enjoy.

(*b*) But selfishness and narrow-mindedness do not rest here, they go farther and do a great national harm. And this is when manufacturers cease to compose and design, only copy one model from another, or one pattern from another, so as to employ fewer persons in the establishment. This brings the greatest harm in the long run, not only to the establishment in the highest degree, where the principle of fine art and science is by copying, lost, but to the whole nation where such evil spreads. England is an example of this, from which cause she has sunk in taste behind every other civilised nation upon which she claims to stand in equal footing, as was sufficiently demonstrated in the Great Exhibition of 1851.

It is a fact that in Germany it would be disgraceful for a master in clothing the real figure not to construct for every garment ordered a new model; or to copy from another which has been a long time before constructed, or from one which happens to be near in form and size. And wonderful it is that the very German just as readily as the Englishman, established in England, especially in London, falls into the plan of copying; from this it comes that garments are tried on over and over again, and almost worn out, before the consumer has them in his possession. A master of his art need not try on, such is only the procceding of bunglers. That this is true is proved that in the largest establishments where most is copied there is the most spoiled; and in the middling manufacturing establishments where most is designed composed and constructed there is again in proportion less spoiled in fit and taste, as it is made a point to construct the model to every order; and again in very small establishments where limited means do not allow of scientific modelling at all, and there is nothing but copying, there is the most spoiled in fit and taste. If a master manufacturing to order were to copy only, where is the diference between his article and that ready made?

These hints are not given in any reproachful spirit, they are truly written for general instruction and benefit, especially to direct the young and ambitious commencer, for whom there is ample room if his industry, skill, and knowledge of the art are such as to make him known to the influential consumer, and by which he can get fairly paid for his superior products. Let the young commencer remember that in ancient times valour was rewarded by risking life in destroying towns and catching beautiful queens, but now valour has its reward in amassing wealth in a nobler way, by industry and free competition, and by giving to the consumer better, and at the same time more beautiful articles.

SUPPLEMENTARY REMARK ON VARIATION.

¶ 9.——If then, as from the preceding statement it appeared that the construction of a model for every garment ordered is of such great importance, and as from previous instruction the arranging of the drapery (clothing or garment) to the figure must be absolutely correct if such garment shall be tasteful and becoming to it; and farther as the position or carriage of the figure as well as the costume (style of the garment) influences much its tasteful and otherwise correct form, then it may be justly inferred that the knowledge of variation in constructing models for draping the figure cannot be enough impressed on the mind of the student.

Now, the variation of the model according to the position or carriage of the figure, and its variation according to the costume (style of garment) are quite different from one another, although the model for one and the same figure may be intended. Hence there must be a double variation of the model. An example of this may be easily illustrated by fig. 8, Pl. 12 of this work. On the same plate are presented figs. 2 and 3, models which are constructed according to the form of the figure, normal in its form of dimension as well as in its form of position. But the costume of the present time requires that the model must have such an increase in the front of the waist as if the figure had a first increase D^{+}_{I} in this part, similar to that model presented under fig. 7.

It is clear if the costume of the time demands such an increase in the front of the size of the waist in addition to that which the figure requires, then must such increase not only be attended to in models for normal figures, but also in those for abnormal ones. For instance, such a form of model with a decrement (D^{-}) as seen in fig. 8, must be added, in the front of the waist, the increment of costume (costume difference positive). Here then has the model according to the figure D^{-}, and according to the costume D^{+}; but $D^{-} = \frac{1}{4}$ of an inch, about; and $D^{+} = 1$ inch; hence the normal size receives an addition of $\frac{3}{4}$ of an inch in this case. From the above example it may be seen that a similar proceeding must be adopted, if the model is for a figure of the form of D^{+}_{I} or $D^{+}_{\mathrm{I}} + D^{+}_{\mathrm{II}}$; only with so much difference that in slender forms the costume difference may be added liberally, whereas by the broad forms such must be added sparingly. The artist must in cases like these be guided simply by the æsthetical principle, namely, to place the figure which is to be draped, and that which is of a normal form mentally before him, and think the ratios of the parts in that figure before him to be draped, are to be in approximation equal, when draped to those of the parts of the normal form. However complex a case may appear to be, in reality each one is extremely simple, if proceeded with in the following order, namely, from one condition to the other. Naturally the student must be correct in the primary elements out of which he composes the part, and in the parts out of which he composes the entire.

He may ask himself the following questions:

1.—What primary form of the figure have I before me as to its dimension?	Proportionate, slender, or broad?
2.—What abnormal form of figure have I before me as to its dimension?	What decrement, what increment?
3.—What variation, as to position of the figure?	Deviating positively or negatively from the normal position.
4.—Am I clear in that which constitutes the normal form of position? and wherein is the difference between a normal form of position and that of a normal form of dimension in a figure? from what do we understand all these forms in the human figure?	

And then if perfectly clear in all these points the variation of form according to the fluctuating style in the costume is extremely easy, and the style produced is elegantly beautiful on the figure. But without certainty in the primary elements, the artist falls into guessing, loses the ground-work in modelling, he copies, and sinks into a mere bungler, producing unsightliness instead of beauty, and thus he clothes the figure unbecomingly.

Speaking of unsightliness here, it may be mentioned that a waist as short as at present, namely, the real length equal to the normal length as in fig. 2, and then made larger in the size of waist at the front than the figure requires, is not in normal ratio to the increased waist; and ugliness of form would be the consequence, if the length of waist would farther decrease and the size of it increase. Though the artist is here directed by the costume of the time, he must still adhere to the æsthetical principle, and be chiefly guided by it; he must hold fast in the mind the figure with its normal ratio, and approximate it, if he is not allowed to equal it, and the beautiful will be preserved. For this reason, though the real length of waist is demanded to be made equal to the normal length, still he would make it longer on account of increasing the size more in the front than the figure requires it.

There have been and are costumes where the length of waist is much shorter than the normal length; but then the artist guided by the æsthetical principle produces in the form an approximation to the normal ratio, in decreasing the size of the waist in the front accordingly. As an artist, he must cultivate and elevate, not lower and destroy human taste. Interest can never induce the artist to forsake the beautiful, similarly as interest can never fascinate the nobility of morality to forsake virtue. The artist or the scientist venerates the truth in the principle of the good and the beautiful, and his purer mental being like the warming sun, calls forth the charming new and fresh from all that he touches.

A FINE ART VIEW OF THE CLOTHED FIGURE.

¶ 10.——It must have struck many reflecting and thinking men that every ready made article in any industrial art may be beautiful and correct if science and fine art are employed in its production, except ready made articles of apparel. And still not a single article which ornaments and decorates man is so purely an object of fine art as a human figure most simply draped or clothed,—not meaning ornamented. The truth is clearly this that ornaments merely, of all sorts can be beautiful by themselves, without being connected with any other object. For this reason they are proper mercantile objects, in the same time that they are beautiful in themselves. But it is not so with simple draping or apparel, because this can only be beautiful in connection with the figure, and ceases to be so immediately it is separated from it. There is a clear and tangible proof of this, namely, that every kind of form in a human figure has its especial points to which the drapery or apparel must suit, in order to bring out the beautiful in that form. Hence it is self-evident to every clear understanding that a ready made article of apparel for the human figure can have but a rare chance of suiting a special figure. And for this reason a ready made article of clothing can never be an article of beauty in the hand of a seller, until a figure is found which is perfectly suiting to it. Ready made articles of apparel therefore find their admittance only among the vulgar, or those devoid of taste. Hence it is that in countries where people are sunk below the standard of taste, or have perhaps never reached it, so many ready made clothes establishments are to be found; and that in the same degree that people advance in culture of taste, order trades in this department of industry increase, and those of the opposite kind decrease. As a proof of this assertion it is known that in every town upon the globe among the higher classes there are order trades; and amongst those void of taste and the poor, there are ready made establishments. Now apparel is of such universal necessity to all ranks of men, that the taste of a nation can well be measured by it; and it will be found to have sunk lowest where nobles, and prelates even, neglect to elevate trades to arts, tradesmen to artists, by directing their wealth to augment the purity and beauty of this branch of art, and instead, vulgarise and vitiate the taste by supporting the means which lead to it. But this class of men being in numbers the most enlightened in a state never persist in a false direction of their wealth; they always endeavour to promote with it the best, only doing the contrary while selfish speculators delude them, which in the line of apparel is easily done, as there is not sufficient literature of this kind circulating, in a generally readable form which instructs them in taste, and exposes the false tasteless and vulgar. The "Art Journal" for January, February, March, and April of this year 1853, has some excellent articles, and it is to be expected others will follow to cultivate this most beautiful branch of art.

Taking now all elements together which have been argued upon, it is evident that persons in this branch of the industrial art (more appropriately named fine art), making articles of apparel to order have success insured to them, if they will by industry and knowledge rise, make their trade to an art, and themselves to artists. Then, as shown in the previous paragraphs, most of the order trades existing, especially the larger ones, have neither done much better than merely copy one form from each other, and they fall beneath the standard of producers of tasteful articles, and for that reason cannot stand in the time when the cultivation of taste is making progress. Self-interest and ignorance must necessarily diminish in the course of the now-moving elements. Even wealth is no barrier to the steadily rising sun of intellect, revealing and augmenting the true, the good, and the beautiful, for the sake of all who love to dwell in a pure and serene atmosphere; and as carried on the wings of the industrial principle, creating not only physical, but also moral purity.

On the preceding arguments may be linked a curious misunderstanding showing itself frequently between the employers and the employed in manufacturing industry, and in fact tending to impede the development of the nobler elements of man. Such retarding elements as misunderstandings may have very much added in England to the obstruction of the fine arts, and amongst them the scientific principle in her manufacturing. Namely, the employer urges that "if the employed is more skilled and better informed than I am he will not stay to serve me." On the other hand the employed says, "if the employer knows too much it is not for my interest; he is finding fault with my proceedings, directing me too much, requiring productions of greater taste, and ends with dismissing me, to engage some person in my stead." It is wonderful to say, if there are wonders, both of them in their misunderstanding, or rather in their understanding to pull one another down, depart each his own way to look out for some one who is more ignorant than himself, in order, as he terms it, to master his opponent. Were it not more desirable that both should learn, improve, and harmonise instead of separate? There are other more reasonable causes of uniting and disuniting; in which skill and knowledge are equally concerned, namely, if the one or the other is uninformed or unskilled, and the better informed will not submit to a depreciation of his skill, or aims to bring himself and his art to a higher perfection and elevation. In this case there is a very reasonable division, because wisdom cannot blend with stubborn, self-conceited, and stiff-necked ignorance, similarly as virtue will not blend with vice. For the mental (spiritual) world has its opposing elements just as the physical. Add negative to positive and the values will destroy each other. Add negative to negative, and positive to positive, both will make an important sum. And so will blend wisdom with wisdom; virtue with virtue; and wisdom and virtue unite in the dominion over every sphere of human action and industry, however small or great, if man by his own will identifies himself with them. Farther, the human mind when young is especially active, and desirous of being employed, and as experienee has shown that the most active and vivid minds are those requiring unceasing occupation, if there is not some of a proper kind given they will turn to a pernicious one; while the weak-minded on the contrary fall into slothfulness if not employed. Were it not then better for parents to observe this natural law, and direct their youth in the pursuit of the fine arts, and the scientific principles kindred to their industrial art (trade or manufacturing art)? And that with the two-fold view, first to prevent the inroad of destructive principles, second for their completion in their art, as tending to their own self-respect and interest, and united with this the placing them in the road to gain material as well as moral wealth, instead of seeing them in a way to become but secondary or even quite useless members of society. While some, on account of not being habituated to a systematic and orderly direction are dabbling a little bit in one branch of industry and a little bit in another. "Friend—whatever thou art be that completely and entirely." To be but half in an art is to be a lever without a fulcrum.

TEUTON CAPE MODEL.

¶ 11.——The Teuton Cape is a loose over garment with a sleeve, in other respects it resembles the Italian Cape. Both these articles are considered very elegant to wear as over garments in the summer; but as the Italian Cape is really unencumbered with a sleeve, and the Teuton Cape has one, it is obvious that the former from its lesser weight is more adapted for the summer, and the latter for the winter season. The form by itself, the first being lighter and the second heavier in appearance, would decide the opinion of those persons who are guided by the æsthetical principle. But again with regard to those who have no keen perception of the beauty and suitability of form, and see nothing but the bare utility, either of them will be found adapted equally to each season, only that for the summer demanding a light, and that for the winter a heavy material.

The figs. 1 and 2 Pl. 3 Appendix present the Teuton Cape model, which may be compared with the Italian Cape model Pl. 2 Appendix. The construction of the Teuton Cape is very simple. Fig. 1 presents the forepart with its proportion numbers and measure. First make the entire length A B equal to the length required, but it should not be longer than the sleeve and three units in addition; for a person with a long arm the quantity added should be even less, otherwise its entire length will not be becoming in relation to the whole height of the figure. After the co-ordinates in right angles are defined by their proportion numbers, and the chord D C is drawn, halve the chord, and draw E F; make E F equal to the length of the sleeve, measured from the vertex E. Draw from E out with E F the curve F G; and after this draw from the point H out with the distance H F the curve F I, and make G I = F G. The rest of this part is very easily perceived without farther explanation.

The hind part fig. 2 is obtained by drawing first a quadrant A B C with the radius A B = 7½. After this make A D = 1 and draw the chord D C; draw the curve B E F by free hand. It needs scarcely to be mentioned that the curve B E F of the hind part is joined at the curve E D K L of the forepart.

There is another point worth mentioning in connection with the construction of this model, namely to mark what difference there is in the circumference of the shoulder or axilla angle of the cloak model and that of the half circle of a geometrical figure. The cloak model is deduced from proportions found in nature by the studies of anthropometry, a natural science. The half circle, true in itself and universal is a figure of pure or abstract science. Hence it enables us to measure and clearly to comprehend the parts in relation to each other, of special nature and of art. Thus for example place together the hind part and the forepart of this model on the line A G in the vertex B, see fig. 2; now we see that the forepart has an angle C B G = 90°; and the back has only A B C—E B C equal to 90°—40°=50°; hence is C B G+A B E =90°+50°=140°. Therefore the circumference angle of this model in the axilla, 140°, taken from the geometrical figure of a half circle, 180°, is 180°—140°=140°; the difference between the geometrical figure and that of the model. Or as following:—

$$\begin{array}{ll}
 & ABC = 90^\circ \\
 & ABD = 10^\circ \\
\hline
\text{Hence is} & ABC - ABD = 90^\circ - 10^\circ = 80^\circ = DBC. \\
\text{Now, as} & DBC = 80^\circ \\
\text{divided by} & \quad 2 = \ 2 \\
\hline
\text{it is} & \frac{DBC}{2} = \frac{80^\circ}{2} = 40^\circ = DBE = EBC. \\
\text{Now, as} & \quad DBE = 40^\circ \\
\text{And} & \quad ABD = 10^\circ \text{ added} \\
\hline
\text{it is} & DBE + ABD = 40^\circ + 10^\circ = 50^\circ.
\end{array}$$

According to this the hind part $ABE = 50°$
And as the forepart is $CBG = 90°$
Hence is the entire angle of the model $ABE + CBG = 50° + 90° = 140°$

Now take the angle of the model, 140°, from the angle of the geometrical figure 180°, then is the *difference* of both $180° - 140 = 40°$ the same as above. The situation of this difference is in E B C.

The same result is obtained if the hindpart and forepart of the model are placed as fig. 3 presents; but we must, in this instance think the quadrant A B C twice, namely $2\,ABC = 2 \cdot 90° = 180°$; and the hindpart A B E plus the forepart A B C equal to $180° - 40° = 140°$ as above; because the angle E B C $= 40°$ is the difference of both figures, which is not filled up with the model. This angle which indicates what amount of angular space is not filled up with the model may be termed the immaterial angle of the axilla, when the other which is filled is termed the material angle. All models for loose garments may be defined by the angular magnitude in the axilla angle with great practical utility, and it may also assist to define the form in this part of the model.

FRENCH MORNING GOWN MODEL.

¶ 12.——The model fig. 4, Pl. 3 Appendix is for a French Morning Gown, which is an article that in all the changes of fashion has remained the same in its form, and by gentlemen of nearly every nation preferred before any other style of this apparel; indeed no garment is more suitable or more elegant for the purpose it is designed.

The construction of the model for it is extremely simple. After drawing a square line A D B, define the co-ordinates by the proportion numbers, as is presented in the model, for the hind and forepart in the same time. When this is done it is evident that E B is the normal line for the height and form of the axilla in the model. If there is now taken $EF = 1$ unit from the normal form E B to define the hindpart F B, and $EG = EF$ added to the normal E B in order to obtain the forepart G B, then the model in the entire of the axilla remains unaltered in quantity, but the style of the axilla is by this permutation of the normal line E B improved, as seen when the garment is put on the human figure. The thoracial line H I equals here 11 units, whereas in other loose garment models of this kind it is equal to 10 units. This special increase is made that the hindpart K B and the forepart L B may be broader in this model than those parts are in other models. Farther as O I P evidently directs the size of the surface in the model, it is clear, that wherever K is taken or fixed on the hindpart, Q or the forepart must be found accordingly; hence is $QP = PK$, and $IQ = IK$. It is by itself clear that R Q is parallel to or divergent from O P, similar as S K is parallel to or divergent from O P.

The collar on this garment is a Hungarian roll collar, sometimes termed a shawl collar, and easily placed correct if B T is put under a right angle to E B, so that the angle E B T equals a right angle, and afterwards B T made equal to B D. Also B T U is equal to a right angle, $TU = 6$ units, and U V is drawn by free hand.

TEUTON PILOT MODEL.

¶ 13.——Under fig. 5, Pl. 3 Appendix is presented a Teuton Pilot model, which is, with some exceptions, similarly constructed to the one just described in that of the morning gown. As a model for an over-garment $AB = 3\frac{1}{2}$, but in a case where it is not to be worn over it is better to shorten the collumial curve of the forepart by making $AC = \frac{1}{4}$ unit. Also here as in the former model in the axilla $ED = 1$, and $EF = ED$, but $GF = \frac{1}{4}$ gives the curve G A falling $\frac{1}{4}$ lower in G than the tangent F A. Farther the hindpart and the forepart are less broad than they were in the former model and therefore the thoracial line $ML = 10\frac{1}{2}$ is less also. N M directs the surface, and for that reason the quantity taken in N from off the hindpart is again put on in N to the forepart. There is still one more important point to be observed, namely that H I = O B, in this instance equal to 1 unit, the fovea axillaris of the forepart, is to be placed higher than it is found on the hindpart, as the point P of the forepart indicates where the point M of the hindpart is to be joined. The reason for this is the circumstance that the lower angle of the scapula on the human figure has a definite position in relation to its levator vertex; so much, that O of the hindpart will take its place in B, if the garment is put on the figure. Hence the closer a model is constructed to the form of the figure the more attention should be given to this fact to construct accordingly.

It may be an assistance in clearing up the form in the axilla in different models to make a comparison of the angles of the axilla of the three models treated of, namely, in fig. 3, the angle E B C = 40°, and if B C joins in B E, then the unfilled or immaterial angle is 20°. But if as in fig. 4, G B is joined on to F B, then the immaterial angle E B C = $22\frac{1}{2}$°, and this is also the case with the same angle in fig. 5, only that in fig. 5 the point F is still farther reduced, which is not done in fig. 4. From these comparisons we see that the looser the garment is to be, the more material, and the less immaterial angle may be allowed in the construction of the model; and the reverse holds equally good in a closer model. But not less material angle can be, taken than the exact size of the human figure requires, for if too little is taken in the axilla of the model the levator vertex in the collumial line becomes too loose, and would not touch the figure in this part, which being the case no garment could be correct.

The sleeve to these two last models are of one and the same form, as presented under figs. 6 and 7, the construction of which has already been treated upon in former articles in this work. But it may be repeated with some slight difference; a piece of paper is folded double in A B, A C = $3\frac{1}{2}$, and D C B made equal to a right angle; D B made equal to half the axilla line of the model ($\frac{1}{2}$ armhole) and after that, the size A E is fixed, and E D drawn; draw a straight line F G in the middle of the area E A C D; make H G = $1\frac{1}{2}$ equal H I, and draw the curves B G D as well as B I D out by free hand. When this is done open the paper, fold it again so that E D of fig. 6 takes the situation of E D in fig. 7; A D is held on in B, but E D is stretched out in C; D is joined in the middle under the arm, F in the front, and G behind.

The form of the Collar fig. 8 is given, the construction of which has before been defined; its size is to be taken so as to make it correspond to the entire collumial line of the hindpart and forepart.

It must be remarked in conclusion that all three of the models are constructed by one and the same proportion measure drawn in fig. 1; and that such measure of size must be taken rather large, as it invariably should be in models for loose garments; for instance, if the neat size of the breast measure is 18 inches, then the measure used in the construction must be 19.

VARIATION.

¶ 14.——In the course of this work the variation of a model according to a servant's form has been treated of, and also the style of servants' costume; such variations being illustrated by the figs. 2, 3, and 4, Pl. 17. It has also been explained that it is better to increase or decrease corresponding parts in a model, if only certain parts in the figure deviate or vary from the normal form, and that only certain parts in the model need increase or decrease according to the style-form in the garment instead of constructing the model under these circumstances by a larger or smaller measure than it would require if the figure were normal in all its parts. See for the latter the article on Over-Garment Models. It has besides been fully explained in the article on Variation that the increments and decrements may be taken as small or large as we please according as the corresponding parts in the figure may require. And, as the quantity usually required is $\frac{1}{2}$ unit, the general terms substituted for $d\frac{1}{2}$ were dx and dy. Still some persons (strangely) have understood that the differences dx, dy &c. &c. should always be $d\frac{1}{2}$, even when the case required $d\frac{1}{4}$ or $d\frac{3}{4}$. To aid them in seeing it quite clear, it should be borne in mind that the normal form of the model must be before all constructed by *a correct measure of size;* and after this according as a certain part or parts in the figure deviate in size and form from normality, the corresponding parts in the model must be increased or decreased by dx, dy &c. &c., in any case where it may happen that dx or dy, and so on, is ever so large or ever so small. The fluctuating part in the human figure defines the magnitude.

For this reason whenever it is found that for any given figure the increments or decrements in the examples given under figs. 2 and 3, Pl. 17 are too large in the one case, or too small in the other, they need only be taken suiting to the circumstances less or more. If it is required to vary, less than $\frac{1}{4}$ need not be allowed, it would be better to leave the model normal; more than $\frac{3}{4}$ very rarely—according to experience—is required. As to the question if a part (element) in the model demands a certain increase or decrease; then, of what size must the increase or decrease be in the rest of the parts? The law of this is laid down in the examples given in the course of this work.

¶ 15.——There is a case where the figure in the acromial region, or acromial circumference is out of proportion large (large in the shoulder) sometimes the reverse, small (small in the shoulder) in relation to its thoracial circumference (breast measure). It is required that models shall be constructed according to these abnormal forms of the figure. Such is easily done, but in order that the student may attain a philosophical insight into the matter, a few remarks may precede this part of variation.

There is a geometrical figure known under the name of the Pythagorean theorem, see fig. 7, Pl. 17, which presents such truths, that always the sum of the squares 9 and 16 erected on the cathetes A B and B C of any right angled triangle, A B C, is always equal to the square of 25 erected on its hypotenuse A C.

Leave once this general truth out of question, and choose out of all right angled triangles that special one the cathetes of which are, as here in fig. 7, composed of the numbers of units 3, 4, and afterwards term all such, normal triangles; think one in the same time as a special figure, as a form which may be put down, and may stand up like other special things in nature and art. If we think it so, we can also think it as having breadth and height, A B being its breadth and B C its height. Now there is a figure placed before us consisting of three parts, namely that of 16 is composed of breadth, that of 9 its height, and that of 25 composed of breadth and height. A unit then in A B may be termed b, and a unit in B C may be termed, h. If a unit h equals a unit b, $h = b$, then will the unit h as well as the unit b measure the unit in A C. All forms where this happens that $h = b$ shall be termed proportionate forms: but the rest where $h < b$ shall be termed broad, and where $h > b$ shall be termed slender forms.

Farther, each of these three kinds of forms shall be normal, but if a part or parts of any of these kinds of forms should increase or decrease, then the varying form will be an abnormality in the parts, though in its primitive it is of a broad, a slender, or a proportionate form.

In order to illustrate this let there be chosen at liberty any one of these three kinds of forms mentioned. For instance the fig. 8, Pl. 17 shall be one of those normal forms, consisting of its normal parts D, E, F; think now B C increasing or decreasing as much as you please, say as much as C G, then the part F of the figure will also increase into a greater square B G H I. If the normal square is termed F the larger one may be termed F′, and the difference between $F' - F = dF$; which means that the smaller square taken from the larger gives a difference, infinitely small or large, as the increase C G is infinitely small or large. But if the square F increases into F′ then E must of necessity also increase into E′, because with the increase of B C into B G, the magnitude $AG > AC$; therefore the square of A G is larger than the square of A C by $E' - E = dE$. (It has been mentioned before that d is not a quantity, but a symbol, denoting that the quantity before which it is placed is the difference between two foregoing quantities). The A B shall be always given, and is therefore always a constant quantity. Similar to this is it also with the increasing and decreasing in certain parts in the human figure. Take for example the thorax, see fig. 9, Pl. 17. Here is always the thoracial line D E given, and for that reason a constant quantity. This thorax of the figure always consists of three parts; the lower part D E K I, in D E constant, the middle part B C E D, in B C fluctuating, and the upper part (axilla) A B C fluctuating also, accordingly as the middle part of the thorax B C E D may fluctuate. It may now be easily conceived that, as always the normal parts B C E D, B A C of the thorax are known, its fluctuations and differences D F G H E C A B may be readily determined, when we know from experience that such generally increase within the limit of $\frac{1}{2}$ unit, and decrease the same, and if we are also acquainted with the laws giving the amount in quantity and position that a second, or a third quantity (part) &c. increases or decreases, when a first quantity is increasing or decreasing.

¶ 16.——As it is especially here the object to show the variation of the model in the region corresponding to the middle and upper thoracial parts of the figure, such variation can be more efficiently illustrated by the example of a model where its practical value becomes at once clear.

Let then fig. 10 present a portion of a model where the parts A B C D E, F G H I K are normal, corresponding to the middle and upper parts of a normally formed thorax. In its normality E D is joined at K F; and the form A B C D E, F G H I K joined in E D with K F will cover the middle and upper parts of the thorax in the figure. C D + F G will equal the collumial line, and even so will A E + K I equal the axilla line in the figure, and similarly with the remaining parts in the form; as before said the entire form will cover or be congruent to the middle and upper parts of the thorax.

The thoracial line A B + I H is always given from the figure (commonly termed breast measure) and it is for that reason always a constant. Also the normal form A B C D E, F G H I must be once thought as constant, being always defined by proportions; but in the same time fluctuating in the acromial region, L E, K G, and fluctuating in the entire axilla L C D E, F K G.

If now the figure in this region increases or decreases it does so in L E and K G, and in C D and F G; namely in such a manner that the form, here fig. 10, must increase or decrease in the direction that E D F K presents it accordingly. In fig. 10 is given a form with its increase E D F K, where E K = D F. But whatever the amount of increase in D F may be, L C must increase $\frac{1}{2}$ D F and also H G must increase $\frac{1}{2}$ D F; expressed in words the increase from the normal point C to the variable point C′ is equal to the half increment of the axilla breadth. After this let a curve be drawn from the variable point C′ parallel to C D, nearly touching F and continued thence to the variable point G′, as C′ F G′ G″ presents. This will be the varied collumial curve for the increased form L E K G G″ F C′, fig. 11.

The decrease in the axilla region in this form is treated reverse to the previous and scarcely needs any explanation. Still to some persons an illustration may be acceptable. We see then under fig. 12, the form which this variation presents. Here is the normal form L E D C and F K G, but K F D E is its decrement. If this, then is ′C C = $\frac{1}{2}$ D F, and also G ′G = $\frac{1}{2}$ D F. Now let these be drawn by free hand the C F parallel to C D, and continued from F to ′G, the G moved into ″G, and the line ′C F ″G is then the varied collumial line, as the decrease of the axilla required it.

There are some complex or compound cases of this sort of variation, namely to change the form according to the increase of the axilla height in the same time that such form decreases in breadth. If this variation is intended to be made there must first be the increase according to the axilla height, and afterwards the variation followed according to the decrease of the axilla breadth. The other case of this is, when the height of the axilla decreases and in the same time the breadth increases. In this case also the variation must *first* be made according to the decrease in the height of the axilla, and then followed according to the increase of its breadth. Two more variations are possible to be made in this form; namely, the first, is that which can be made according to the *increase* of the height and *increase* of the breadth in the same time, second, that according to the decrease in the height and decrease of breadth in the axilla. Any other cases than these are not possible in the variations of form which the axilla may assume in the human figure.

A variation in the model according to the increasing axilla line in the figure may be presented under fig. 13, Pl. 17. This variation is sometimes caused by the increase of the figure in the pectoralis, infraspinatus, and deltoid muscles, but sometimes it is occasioned by mere style of garment. But in either, the modeller is enabled to obtain a larger sleeve part, and greater ease in the axilla line than could be obtained if of a size suiting the normal form, which was the object of this variation, in order to produce a different style in a garment, making it in the same time more comfortably adapted for warm summer weather, and still not too loose to be becoming, keeping in view the æsthetical principle in the variation.

The three differences (increases) in C D, F E, and G H are each of them equal to ½ unit; and the two differences in C B, and K L are each equal to ¼ unit. It is simply to be borne in mind that the increases and decreases are differences lying between the normal quantity and its altered magnitude, deviating from that normal state. As in construction the normal quantities are always known, defined, and presented as constants, we need only give attention to the varying differences, and observe to keep the relation (ratios) of them to one another in this fluctuation. Close observation and steady attention can only disclose to us those laws; and without which no one can say he has experience or knowledge in form of position. But it must in the same time have become clear to the attentive reader of this article that the variations are according to the figure, or to the style of garment, (costume) or according to both of them together, and are by no means difficult or dark, but the reverse clear and intelligible. So for instance is A B equal normal (n) plus difference ½; B C equal normal (n) plus difference ¼; and K L equal normal (n) plus difference ¼.

Whoever would like to study pure science, and in the abstract conceive the ideas of differences and differential, may advantageously engage themselves with a small book by W. S. B. Woolhouse, published by Mr. Weale, Strand, 1852. The ideas called forth by this science are most valuable and enlightening to every one occupied in any art involving forming or shaping. The student in an industrial technic will soon find in his practice how far, and in what manner this noble science is of real practical use to him. *To combine pure science with a useful and industrial art is a most profitable and high achievement.* But however humble an industrial art may be in which a man is engaged, if he raises his occupation on the wings of science to an industrial technic he raises himself with it, not only to his own profit in the production of superior articles, but also in becoming esteemed by the worthy and best informed: who being themselves of a scientific and æsthetic culture, as touching their own being are kindly and fostering in their contact, like the sun meeting his own beams in the deepest cavern, warming into life the latent blossom and fruit.

SPANISH SLEEVE CAPE MODEL.

¶ 17.——In ¶ 3 Appendix, a Spanish Sleeve-Cloak Model was treated upon. This model may be converted into a sleeve-cape model, of the form represented in fig. 1, Pl. 4 Appendix, if the fovea axilla point I in the model is brought nearer to the corresponding part in the human figure, than was done in the first mentioned model. This borne in mind the construction of the model will be by itself evident; because the relation of its parts are defined by the co-ordinates and proportion numbers; co-efficients of the unial quantities. However it must be observed that from the levator vertex A, with the radius A B, a small curve B C is to be drawn, and after this a right angle (square) placed on A D, which must slide towards D, until it is in the position A D E, so that the leg D C = 10 units, and intersects the curve B C in C. If A C is now drawn, and also out of A with the radius A E = 4 units, a circular curve E F G H, then will G F = $\frac{1}{2}$ unit as nearly as possible. The angle H A E which is filled up by the material of the model is equal to a right angle minus $\frac{1}{2}$ unit, in the chord F G. This shews that the material surface of the model in the axilla region is full, and may for this reason, if required, be lessened; for it has been said before in the course of this work that the entire in the axilla of the figure can be covered with an angle of 135°; but here in this model the corresponding angle is nearly 2.90=180°. Of course it is to be understood that the sleeve part A D C is folded in A D, and therefore double, and that K A B the hindpart, and L A B the forepart, are placed one upon the other. And farther, that this entire surface 2 H A E is meant to cover the axilla of the half human figure.

Farther, fig. 2 presents the same model just treated of, only with the difference, that the surface of the axilla is less than such is in the previous one. The immaterial angle B A C has, which will be seen by comparison, become larger, and according to the amount of this increase, the material angle has naturally decreased, though not in right, but in curved lines, as B A and C A present. In order that the collumial curves F A, and G A may not be contracted (the model being for a loose garment) by taking the seams from A B and from A C, it is better to increase A B by making D E = 1 unit, and to draw B E instead of B D.

As there are some persons who rather prefer having the sleeve point drawn separately, the model presented at fig. 3 may be acceptable. But, in every case of constructing a model of this sort, the sleeve part of it being drawn as presented at fig. 3, as in the foregoing figures, after it is taken out of the paper, must be opened at the crease A B (see fig. 7) and the point B varied into the position C. This done, the point C, instead of B, is taken as the vertexial point B. From the point C out the full lines are now drawn, as C D and C E represent them. The line C E is put in the forepart, and C D on the hindpart. The deviation of the straight sleeve form D B F into the forward bending one D C E is simply on account of the human figure being depressed in the clavicular, and projecting in the scapular region; and though the garment may be ever so loose, if the model is not harmonious with the figure, it will not fall upon it naturally and with ease, but it will fall unnatural and distorted, shewing a strain upon the figure, which the man of taste and cultivated eye can quickly distinguish from folds of the garment natural to the figure, however full that garment may be. In this model there is, besides, no difference from the one just described, except in its being double breasted, while the first was single; however, this is optional.

Farther, it is evident that in this style of garment, the sleeve part, with its greatest height A, is put in the vertex A′ of the forepart, instead of its being otherwise put with its extreme height in the acromion of the forepart. From this reason, the garment made according to this model is also termed the vertexial cape. If the model, with its foveal point B, is brought still nearer to the fovea axillaris of the figure, and the garment made of some blue material, trimmed with a gold cord on the seams A B and A′ B′, it would be extremely well adapted for a painter's studio on the lay figure for an Eastern costume.

This style of apparel (the Spanish sleeve cape) may be changed into another, even of greater taste, termed a cutter, and in a strict sense of the word a cutter he must be in many ways. A rule is given to him: *the garment must be general*, and *for no especial form* of a human figure. Thus are enumerated all the departments or branches in the manufacture of garments, without finding a refined part upon which ever could or would be in a slop or machine-system manufacture a single individual employed. Indeed it is well known that a person of artistic skill and scientific knowledge would even be rejected. Thus it is not true that in a slop or machine-system manufacture of garments there is a part or branch upon which any single person, still less several persons are engaged; and lastly the so termed refined is but the fine (thin), set off with fine words, to make the public believe they get articles of art manufacture, when in reality those so termed are but slop ones.

Second, having now dwelt on the system of slop manufacture, and brought with it art manufacture in the course of argument in connection, it is but just to bring also the principles of this forward and shew, that the art manufacture of garments or dress is a special and true branch, which may justly be termed the refined, or in other words the artistic and scientific. It will then be admitted that in an art manufacture of dress the first *principle is the becomingness of the dress to the special form* of figure for which such dress is intended; second, the best material in real internal quality; third, the paying of a remunerating price where talent in art, and knowledge in science is expended, in order that the perfect may be reached. With these principles it may fairly be presumed that the really refined is to be found and cultivated. In an art manufacture of dress, perfectly arranged, first is employed a designer and modeller, a person of thorough scientific and æsthetic knowledge of the human figure, and who is well skilled in the application of that learning to the designing and modelling art for dress, without failing to design and construct a model for *every* special dress or garment; second, persons to cut out by those designs or models. If the establishment is not sufficiently large, then the designing and modelling with the cutting out department are united in a foreman; or the master takes the designing and modelling part in his own hand, and employs a cutter only; or the master cuts out and employs a designer and modeller. Here we see that in an art manufacture of dress, the refined, or in other words the designing and modelling, in dress is really in every position paramount and cultivated, when in the slop manufacture it is as truly annihilated. Nay, the very principle of the one is to make it paramount, when the principle of the other is to destroy it.

Perhaps this slight sketch may aid the public to discriminate between articles going under the same name of dress, but which come from different manufacturers; and further it may be a caution to influential persons and societies against lending themselves as mere advertisements for spurious articles, while they kindly and good-naturedly believe themselves promoting the cultivation of art and science in connection with industry. Let every one know that when the machine-system, supported by a mercantile spirit seizes upon dress, the refined and the beautiful vanish as if touched by destruction, when in the other branches of industry it may be completely successful. The refined or the beautiful in dress is only brought forth by artistic work in the fine art spirit, based upon a scientific foundation, namely, on the knowledge of the forms of the human figure, and cultivated in connection with it.

Third, if the public from a deficiency of taste is unable to discriminate between those articles of dress which are becoming to the special form of the figure for which they are made, that is to say, between the beautiful in form and the disharmonious and unsightly, then there is the more need to promote a cultivation of taste; that the public feels the real want of this cultivation is shewn by its looking eagerly after fashion journals, the forms in which it takes for the really beautiful, when in truth they give nothing more than changes of form in dress void of it altogether. But to cultivate true taste in the really beautiful, sculpture and painting must take the lead, and that in a manner suiting our modern costume and time; doing so alone in ancient costume furnishes us only with the picturesque ornament, instead of cultivating taste scientifically in different kinds of form by our own figures, home apparel, and European costume; then according to some few specimens of this which make their appearance in fine art, it is proved to be attainable.

Let us see farther if there is not also something wrong in the fine arts, similarly as we found perversion in our industrial art just named. The primitive forms of objects in nature and art in the realm of æsthetics are of the three kinds, the proportionate the broad and the slender; especially prominent in architectural forms and human figures. We must commence by such primitive elements if we would start from inward conviction, and be really *home.* Such however is being demonstrated in a proper scientific course of instruction in our Anthropometry, but, in this sketch in hand it is only needful to relate how the mechanism of fine art studies is arranged. This is of two kinds; the one calculated to produce works for the picture dealer or seller, perfectly in the mercantile spirit, and which naturally must cost as little as possible. On these conditions one lay figure must suffice, which answers for both the male and female form. It is usually a female one, and raised to serve for a male figure. Here then are committed two faults, not only that the female form is made to present a natural male form which can never be; but as the mechanism in such a lay figure is very confined it cannot be extended in any other way than in the length of the lumbar region, the result is a positive ill figure,—positive incongruity in the parts, for a male figure. Now disharmony continues mixed up amongst otherwise harmonious elements, as shade and light, sentiment, expression, life, power, gentleness &c., does violence to nature, destroying harmony, and with it the beautiful.

In respect to drapery or costume this studio is just as economically and meagerly provided. Garments from a slop manufacturer, regardless whether they are becoming, suitable, or harmonious with the form of the lay figure—male figure form it has none—are put on, and so one disharmony is mingled with another. Farther by such meagre mechanical means one figure thus arranged must be quite finished before another can be commenced, which causes a feeling as if the whole picture were patched in piece by piece, instead of producing in the beholder the agreeable sensation which arises from perfect, undisturbed harmony. In some studios of this class not even as much as this is bestowed, but a painting is made up out of bits copied here and there.

Different is the appearance of the other studio to which we refer; it is altogether of higher tone and more truly deserving pretensions, where the art spirit works alone, for the consumer, not for the trafficker; nothing is here deficient; nothing is too costly which may assist in the production of the true and the refined natural; to call forth the beautiful by bringing in harmony constituently all the elements belonging to art. Here we find the studio furnished, for the mechanical arrangement in grouping, with three male lay figures, the proportionate, the broad and the slender figures, and three female forms of the three same kinds. These are of life size and perfect to nature in all their parts. Drapery is amply, not sparingly provided. Each figure has its suits of costume, specially adapted to it as corresponding in kind to its form. Not to have costumes harmonious and becoming to each kind would be a certain violation of the laws of harmony in form, just as great as if a part of one kind of form of the human figure would be substituted for a corresponding one of an opposite kind of form. Moreover, the shade and light being different in different kinds of forms, and different in groups from isolated forms, the progress is such in a piece of art that each part in the composition is kept in an equally advanced stage with the rest, from the rough sketch to the complete finish, in order that the harmony of shade and light is continuous, unbroken with the harmony in the parts of the forms. Thus is brought out of different kinds but harmonious elements a continuity of the harmonious, or rather the unbroken melody of form—the beautiful in objects of space—deep, expressive, though soft. The working from a group or groups of beautiful subjects, and a group of perfect and faultlessly draped lay figures, can truly assist to develop the above high qualities, which never can be reached by completely finishing one single figure; and then changing the model of that to finish from it a second and so on. A group of figures should be like a landscape, remaining undisturbed until the artist has completed the whole; he must find it as he leaves it.

The models for the drapery are likewise with all care scientifically designed and constructed, and not less attention given to the proper putting together of the parts of the drapery formed after those models.

From an artist having at command such a studio or atelier so richly provided with mechanical means, it may fairly be expected he possesses the power of cultivating and refining taste, by giving natural and true harmony of form, combined with the other elements of fine arts' own special domain.

Enough has been said to shew that there are two descriptions of studios in the fine arts, similar as there are two sorts of them in our above mentioned industrial branch, and it will likewise be seen where the refined and the cultivated are really produced, and where not, though assuming such. In conclusion, it will naturally be deduced from all that has been said that only the mind with its correct conceptions of the scientific (æsthetical laws in the refined and beautiful) can bring the refined and beautiful in an object of art, more especially so whenever a dressed human figure is the object. Or in other words, only a hand guided by intelligence, and not a machine of metal nor of human flesh and bones can bring forth these qualities in dress. And for that reason society would be better off as respects manufactured dress, or human apparel to reject, at least for home consumption, all machines and machine systems, and let intelligent persons work to order for the consumer. A higher standard of intelligence and morals would be the practical result among a large portion of the industrial class, with the diminution of pauperism and its attendant evils.

GUESSING AND KNOWLEDGE IN APPLICATION TO ART.

The industrial Technic, viewed broadly in its farther development through the application of science, consists of almost such an infinite number of special arts carrying means and power of support, as there are beings in nature full of inherent and energetic vitality for development in the progress towards perfection and higher importance. Some of these arts in the more developed and advanced stage are so highly scientific that they are themselves almost the pure science; when in others, the æsthetical, coupled with the imitative or fine art principle, having less of the scientific, prevails. But every art, and more so an industrial one, is always of a mixed kind, and the method of pursuing either properly, at least in some parts, is mathematical. Mathematics are therefore first to be pursued by the student, striving to become an artist and scientist. After this ought to follow the natural and philosophical sciences, and then the fine art principles, and he possesses the means by which to cultivate and elevate an otherwise mean occupation, to a scientific and æsthetical art. Knowledge—it need not to be proved here—is the issue of the studies of mathematical and philosophical science, and gives the power of action in art to design, to construct and create, in order and progress, the true the good and the beautiful; when on the other hand, the exercise of an art by guess-work produces weakness, uncertainty, confusion, retardation, copying and failure. Farther, the application of *knowledge* to art, not only places us in the position to create Artistic and useful objects of high quality, but it is undoubted that men, engaged in an art highly cultivated, even when the same is of inferior origin, are more intellectual, more moral, and always more respected, and consequently in better pecuniary circumstances; and this especially so, where an enlightened public is able to judge of a production, whether it is bad or good, ugly or beautiful; when on the other hand, individuals engaged in the same arts in the guessing stage, unconnected with any scientific and æsthetic principle, and only executing by guess, being neither artists nor scientists, do not enjoy the high state of intellect and morals of the former, though they may flourish in their art so long as the public is ignorant of the quality of their productions. Thus it may be seen what reward man may reap, objectively and subjectively by cultivating an art scientifically and æsthetically. It appears to follow that even in those arts, as painting and sculpture, which by many are believed to be purely imitative, the artist may so far undervalue the knowledge of the scientific and æsthetical principles, as to sink into the mere artisan, and the artisan on the other hand may by energetic study raise his merely menial trade to an art, and himself to an artist.

It is also correlative that the at first dormant intellectual and moral faculty in man is stirred up to growth in strength and beauty—not in *what* art—but, as to *how* that faculty is directed, or how it is exercised in that art, to accomplish and produce. And this knowledge deduced from scientific investigation is universal, the lever to scientific art above the guess art, which latter is the lowest process in a very primitive state of the artist.

From these nobler feelings, and with a foresight awakened by knowledge and good understanding, desiring to keep the arts elevated that they may elevate humanity, in producing only articles of the best quality in material, form, and usefulness, naturally may have sprung the attempt to coerce the employers into employing in the artistic and scientific branches, the *skilled*, and not the unskilled and uninformed worker. But however noble the end in view, the means, coercion, is wrong; then if the true the good and the beautiful cannot by their own radiant light overcome the opposite views of the master, the matter must be left until he sees that by lowering his art he loses in the end, and with it so far as the sphere of his action goes, lowers his country in that art too. And farther, strange as it is, if unskilled and uninformed men reach the mastership, in becoming functionaries in the upper branches of art, then they in the majority of cases oppose all their influence and strength to every introduction of fine art and scientific principles in their own art, and likewise all improvement, except that which they may by the way pirate and pick up in infinitesimal portions, and keep the master, if he is timid, silent. What cause operated in the first instance that a master placed himself in so perilous a position? we believe short-sightedness, and cupidity on his part by paying mere ignorance to evade the just due to skill and knowledge. Again, if the unskilled and uninformed man becomes master himself, as it often happens, and he remains opposed to all artistic and scientific adaptations to his art, neither correcting or enlightening his mind, keeping instead narrowly on gain, when the public is ignorant of those matters collateral with him, then we see ignorance combined with wealth and shaped in a person whose being is evil, opposed to the welfare of humanity, while opposed to the refining and elevating influences of the arts and sciences.

With all these facts of daily experience before us we must see the wisdom of setting aside these dangerous elements of guessing and blindly believing, to pursue knowledge instead with all energy, bringing such with sound and simple reason in application. The fine arts elevate taste; science elevates the understanding by knowledge gathered from it; and the application of both, to any industrial art whatever, procures the material means for the support of life in a higher stage, and for a greater number of individuals. In this pursuit the good stands in stern opposition to evil, and the great natural and industrial principle is paramount.

Let no one say in his ignorance "my art has no science;" before uttering this let it well be considered whether everything we handle has not a connection with science, either moral or physical; by earnest reflection and meditation we shall soon find that it has. It is science alone, with the assistance of suitable literature in the respective branches we investigate, from which we gather knowledge of things, with which knowledge in application we go modestly onwards, in order and security to the nobler end in view.

But as the method—as has been said before—is mathematical, partly so in every art, and more so in an industrial technic, the application of it must be made with circumspection, only when assurance has been obtained of the reality of physical facts existing, from which, or according to which the mathematical formulas are deduced; otherwise the mathematical method may suffer in reputation. This is necessary to be borne in mind, that many persons in certain branches of industrial art, even if they have some knowledge of the physical science connected with them, have an imperfect knowledge of mathematics; and sometimes it is reversed, they have some knowledge of mathematics, and none of the physical sciences. In this case they imagine that mathematics shall do everything, and consequently the most absurd blunders are committed in the arts under the adjectives scientific, and mathematical. For this reason, it may be a warning to every lover of progress in the arts and sciences to be much on his guard, and farther to bear in mind that the mere art adventurer is always in opposition to knowledge; knowledge being the offspring of science, and the scientific art the flower of knowledge, standing inviolably beautiful by the side of deformity, the offspring of mere guessing. Besides, the acquirements for producing the first call for some application of talent and even in addition a portion of expense, while the second may be possessed without either, and even successfully also, if borne out by an ignorant public. Hence the guessing method is favoured by ignorance, and sometimes even admired; and science and scientific art is favoured by enlightenment, and also admired, but critically. From this it is clear that there are always two distinct ideas in opposition to one another, moving man in the pursuit of the arts. The one active in its influence to lower man, and his works to a chaotic sameness of formlessness; the other active to elevate man, and his works into clear and distinct forms producing in the mind intellectual and moral enjoyments. But as the human mind cannot make the leap suddenly from the lower or guessing stage of art, to reverse itself to the opposite direction or the scientific stage, science is the means and medium by which it may gradually turn out of a chaotic darkness of ideas into the clear conceptions and power of action. To this end may be read with great advantage a beautiful treatise on Comte's Philosophy of the Sciences, by G. Lewes, Bohn's Scientific Library.

But as the work in hand is especially designed for studies in the art of constructing models for draping the human figure, viewing drapery æsthetically, or as a fine art, based upon scientific elements, we would especially urge the study of Anthropometry (geometry of the human figure) without which science (even with a tolerable knowledge of mathematics) the student would not make such progress in the art of modelling as to pursue it with clear knowledge, leaving nothing to guess or mere belief; or if he should be obliged to guess in some rare case, then at least he would not do so with an empty mind, but with knowledge—the imitative principle.

GENIUS

Is that disposition or bent of mind which is peculiar to every man, and which qualifies him for a particular employment. In fact it is the bent of mind to be industrious in opposition to idleness. This genius becomes talent if it is cultivated by close application to an especial art, in a fit and suitable course to that art. Through earnest and undeviating study collateral with practical application, talent develops itself into a higher power of mind, and becomes invention. This is the natural definition of the mental constitution of man in respect to genius. But in the dark ages genius was some unknown power of which man could never have knowledge, some entity which helped to accomplish work for him without his own effort. A fine cheap thing it must have been, pity it always disappears when man becomes enlightened and industrious. Still some remnant of this last genius is occasionally found among our present enlightened community, especially among " Gents " imagining themselves superior to their art or occupation.

Farther, it shews itself in evading industry and instruction, so that licentiousness may gain time and means, and wealth be monopolized and squandered in idleness and ignorance, creating vice and deformity instead of virtue and beauty. But genius sometimes makes its appearance in a negative way, namely its absence is pleaded for the same end, to excuse all deficiency. Still, in the twenty-five years attention, given to the human mind and its development of talent and strength, among a great number of individuals, we never found a single one, who with undeviating application and proper instruction did not discover a strong mental talent; consequently such are the means to call forth the otherwise dormant genius. So much is this true that individuals even in advanced life, if men of pure or mere science, applied themselves to a special art, they have become inventors, hence geniuses of talent. And the reverse, the merely simple artisan applying himself to science, has with its assistance shewn himself equally a man of genius or talent. And whoever is not idle when favoured by circumstances and means can always become talented and a genius in any art to which he may apply with pleasure and liking.

¶ 20.——The proportion measure A B, fig. 1, Pl. 5, Appendix, presents the half breast measure, known from paragraph 71 of my Systematic Instruction Book for Draping the Human Figure. The chief models presented on this plate are for capes, in which are shewn the principles of their construction, whatever they may be in style.

Fig. 2 presents the cape model, which is similar in its principles of construction to that known in the work just referred to—namely, it has in the half the quantity of $1\frac{1}{2}$ right angle, F A E; but its radius A B $= 3\frac{1}{4}$ only, whereas that for a male form would require 4 units; which difference arises from the greater size of neck in the male than in the female figure. The length E G of this model is various, from 20 to 30 inches, or even longer; determined by the principle of suitability or fitness of the garment to its purpose; whether that is mere utility, elegance in general wear, or in a fine art sense to attain the beautiful in the proportion of parts of the dress, as becoming to the especial form of the wearer. A length of 25 inches is that most generally becoming.

First as H A E (see fig. 2) equals a right angle, equal B A H; and as F A H equals a half right angle, the construction is evident. The vertex C is obtained by drawing the chord F E, halving it in I, and A C drawn may be in the same time produced to K. As now from the construction the angle C A E $=$ C A F, so will, if the model is folded together in C K, the F L fall in E G, namely, F in E, and F C in C E. Hence both parts L F C and C E G coincide in angular quantity. Farther, if a perpendicular falls from the vertex C upon the radius A E in D then this will be a centre out from which G K L may be drawn, for a style which is defined in length of back side and front by the ratios E G to C K, to F L, and very becoming. After direct measurement it will be found likewise that A D $= 1\frac{1}{4}$ and D C $= 3$ units. E G is the length behind, and L F that in the front part.

If fig. 3 presents the folded model, namely, the front part upon the back, then it will be seen that the model may likewise be constructed in the manner as folded at once; namely, the vertex F is found if D G is halved; A E drawn; D E halved, and A F drawn and produced to K. Farther, from the centre B is drawn the curve I K; C A is made equal to A R, and from the centre C out with C K the curve K H is drawn.

If the style of the model is to be changed, fig. 4 illustrates how it is to be proceeded with; namely, draw as before with the radius A E $= 3\frac{1}{4}$ a curve E B, and that the process may be shortened make A B $= 1\frac{1}{4}$ unit; erect a perpendicular B F in B and draw A F with its continuation F K. Draw from the centre C with C I the curve I K; and from the centre D with D K draw the curve K H. Now make C F $= 1$, E G $= \frac{1}{2}$ and draw with free hand the curves B F and B G. Let these lines stand for the collumial line instead of B E; then F I is the hindpart and G H the forepart. By this change there will fall a less quantity in front and behind, and as much more will fall on the shoulder and arm B K. It must be well borne in mind that a less angle must never be given for the angular surface of the axilla than this model presents; that is, to cover the *entire axilla* there is required an angle for cape models of not less than three right angles.

Fig. 5 presents another model according to which a cape is very becoming for plain wear. First draw from the centre A out with the radius A B the curve B C, and proceed as at fig. 4. But after this draw with the radius D B $= 9$ units from the centre D out, the curve B K H; halve K B in M, draw D L and produce it to G. The D L intersects A L in L. Make L N $= 5$; draw N C by free hand and take off the angle at L. Make I E of the required length, say 30 inches, and draw from the centre D the curve E G, and from the centre H out the curve G F. This style keeps its full quantity round the shoulder, but it is lessened below it in E G and G F.

Fig. 6 presents a different style of model, but of which the construction is the same as that just described, with this exception, that it is shorter behind than in the forepart B D; but the chief point is here the proper length over the arm. To obtain this make G F = 9 units, and draw from the centre E with the distance of E F the curve F A; draw F D under a right angle in F upon G F, and then by free hand draw the curve F H D. From H out towards A may be added 1½ inch, and the hindpart C A will then be 25 inches in length, which is a becoming one to many figures in all three kinds of form.

Fig. 7 presents still another model of the above kind with some slight difference of style; the construction of which is from the above by itself clear. After C B = 21 inches, is fixed, a curve D E is drawn from the vertex A, taken as a centre. This model has a sleeve, and for the purpose of inserting it a small quantity F G = 2 is taken from the forepart, and nearly as much from the hindpart, in form as indicated by the model. D B is drawn perpendicular upon C D in D, and the forepart below rounded off. The sleeve part, fig. 8, belonging to this model requires no explanation.

When either of these models is to be made as an opera cloak, a hood is added, of which a model is given in fig. 9. Though the construction of it is by itself clear, it may be observed that A is a centre from which the curve B D is drawn, and B the centre by which to find the angle A B C. The E F = 10, and E G = 9, and the curve A D G are drawn by free hand. H C is a tangent to the curve in C and to the circle in H. Fig. 10 serves as a model for a small collar, if such should be required on either of the foregoing cape models.

Fig. 11 presents a Travelling Cape Model, which is very different in style from the preceding. The length of this behind is A B = 30 inches, and the curve B D is drawn from the vertex C, taken as a centre. The proportion numbers define the construction of it, but C E must be halved in F, and the curve C F E be drawn out by free hand, which curve gives the back part. The other curve C G H presents the front. According as the forepart shall be shorter or longer in relation to the hindpart, the centre, from which K L is to be drawn, must be taken farther from the vertex C towards M; in this instance the centre M is 3 units distant from the vertex C, when K L is drawn. The sleeve part fig. 12, belonging to this model wants no other explanation than that the curve A B C belonging to the front is to meet the curve C G E of the forepart. The sleeve length is in general 19 inches.

Fig. 13 presents a Model of a Ladies' Riding Trowsers; but as the proportion numbers very minutely define every part in the model, and as the manner of constructing trowsers models is already known from the preceding, there needs nothing more to be said than that the curve line A B indicates an entire fall of the back part. Farther, that the trowsers must be closed between the legs like a pair of gentlemen's trowsers; lastly, the size E C D must be plaited in a band to the proper size, or if not plaited in, it may be taken out as wedges to exactly fit the size of the waist by measurement.

All the models on the Pl. 5 Appendix are constructed by the small measure fig. 14, except the three namely fig. 2, 3, and 4, which are constructed by the larger measure fig. 1 The reason of using the larger one in this instance was for the purpose of making the assistance lines more distinct in the construction, as the principle on which these forms are founded. It will be observed that the lengths of these models are out of proportion short to the size of the measure, and the collumial line; this is merely to save space which here may conveniently be done, without interfering with the idea presented of style and form, if the artist keeps, in his full size drawing to the text.

DRAPERY FOR THE ARTIST'S STUDIO.

When the great Goethe, a man of equal celebrity with Shelling the father of art philosophy, urged the artist to the study of drapery on Figure Models, Goethe's ideas being expansive, lofty, practical, and great, as Shelling's were deep, searching, and true, then it may be wise and good to develop such ideas in every direction and in every place where matter and mind are of a quality admitting such development, and to be elevated by such warming influences; however common place, however simple the object may be upon which such life giving beams may fall. Especially we must be aware that every thing is great and elevated according to the standard of our own minds, or low and worthless just as we look upon it. Purify yourself in the clearness of understanding, and every thing which springs from your hand will be pure likewise; that is, more and more nearly approach the infinite in the true, the good, and the beautiful.

The human form is the alpha in aesthetics, and the primitives or standards of it, as form purely, are but three in nature and art. First, the Hercules excluding the sentiment of Hercules, the form of broad proportions. Second, Mercury excluding the sentiment of Mercury, the form of slender proportions. Third, Apollo excluding likewise the sentiment, the form of proportionate proportions. These three forms being stripped of their characteristic expression, in each the pure and mathematical form alone is left. These forms are ideal or pure as to the perfection in proportion; they are termed in my Anthropometry for practical reasons, normal forms. Such pure or normal forms we cannot see, nor speak of, nor understand them clearly when spoken of, unless we have systematically studied them; like one who to write and speak grammatically must study language in a proper and systematic course.

But who ever has gone through a systematic order of study, has the power from his more highly cultivated eye and mind to see in every real human figure the ideal or pure form, in the same time that he sees the real human figure as it truly is. And farther, in this manner he detects the differences in parts and in the entire, between the pure and imperfect in form; or in other words, sees and detects the differences between the normality and the abnormality of form in that special figure before him.

The pure figure model ought to be in every artist's model room or studio, whether he is sculptor, painter, or industrialist; not alone for cultivating the eye by such form, but likewise to learn in a higher and in an aesthetic sense to balance and proportion the quantity of drapery correctly to each kind of form in every style of costume; nay, even to find the correct quantity of drapery, before which it cannot be properly balanced. Goethe was fully sensible how necessary correct drapery is for a valuable piece of art. And that it is so is amply confirmed when every artist of the higher class agrees that drapery must or ought to be at least in harmony with sentiment, expression, proportion and form of the figure. The question will arise, what is the good of exquisitely true expression, proportion and form in a human figure represented by art, if the drapery deforms or blemishes it?

With regard to expense it is less costly to obtain models for drapery designed for a sculptor's or painter's studio, than it is to do so for the artist's in draping or dressing the real figure; because the first need only those models of drapery for the three pure or standard forms, when the latter requires them for each individual who applies to him for apparel; farther, he has to humour the accidentals or differences of the form likewise, (for perfectly pure forms in nature are very few,) so that the entire of the clothed figure shall look artistically well. And besides this a man is continually changing in form with his age, while the style of dress is ever undergoing some modification to meet the desire of reaching that which is most becoming, and to create the new; and this last being a fact of constant practical and severe reality, the models must be continually renewed likewise.

The models for draping the figure used by the sculptor and painter are not always constructed by himself. Scientific men sometimes unite with them to obtain by combined judgement higher perfection. If scientific men are not at hand, artists in draping the real figure take their place. But it is to be lamented that the mere tailor should be called upon as a substitute. Nay, some go farther than this, garments from merchant tailors, and even from ready made clothes or slop shops are taken in the sculptor's and painter's studio. It ought not to be alleged in excuse for the sake of saving expense, or of making the matter easy that such garments are taken from this or that nation where the school for that article is said to be in better taste; because nationality has nothing to do with this, the beautiful, resting on its own base may be found in any national costume, and still independent of it. Moreover, the French tailor school is highly theatric and inflated, shewing itself in an unnatural swelling in one part, and in the other in too great depression, in violent contrast of form. The English again are stiff, hard, flat, and cramped. The German, vacillates from one side to the other, and sinks at last into either which comes nearest; with the exception that the possession of more science gives it power to rectify itself sometimes, where not retarded by extreme niggarliness; whereas the aesthetical element must be in every time and in every circumstance, independent of, and above all, as a guiding liberal luminary in the artist mind.

Now the object of this article is, for the sake of elevating art, to point out how to avoid the false and spurious and pursue the true. The sculptor and painter should therefore know of what mind those persons are from whom they take their garments for the studio, and the spirit in which they work; because what is in the man's mind will be visible in his works; and the artist must present what is in his own mind, not that which is in another's when faulty. First, the mere tailor requires but a friend to recommend him, a good position for a house, and especially a showy shop. These are for him primary and essential. Next, a set of patterns, as he terms them, often bad copies from originally good models, spoilt by his own improvements; or sometimes miserable outlines from borrowed garments. This he looks upon as sufficient, and the art and cultivation of constructing models as superfluous; for he does not estimate dress in an art sense, but merely as a necessary covering, as if we lived in a primitive state in caves or hovels, without rank or distinction, in blessed ignorance, toiling only for the absolute bodily wants. Literature of science and art cannot easily elevate him, as he boasts not seldom, and takes much credit for his wisdom, that he never read, nor has a book in his house of the kind, and never got caught in that net. To conclude, he is constant at dinners, spouting a little religion and politics which he does not understand, and thus is made up his intellectual stock and store.

The reader of a cultivated mind and learning may think this a very pitiful condition. But comparing the simple master tailor with the merchant tailor, and slopper, or ready made clothes seller, the first still stands far elevated above these. This forces itself truthfully upon the mind, if we view their aims and operations with a philosophical spirit, from a standard point of art. Namely, the mere tailor is from his very mental nature and bodily habit, shaping and forming, and however ignorant and blundering he may proceed, his handicraft is such, that there is a possibility of elevating it to an art, and himself to an artist, if the right means are adopted. From the nature of his occupation he is likewise more humane, arising from feeling himself the difficulties in producing the becoming in draping or dressing the human form. In comparison to him the merchant tailor or the slopper is from his very nature void of such refining and humanising elements; his mind is not in the human figure as to its beauty in form and proportion, nor ever does he dream even of shaping and forming any thing at all; literature of science and art he scorns; but his mind and hand are solely absorbed in sale and profit; he can nothing respect for continually thinking of the one or of the other. He fails to produce the beautiful if he attempts it because his hands are not guided by a mind and soul full of knowledge and love for art. He distorts because ignorance and avarice rule his actions. Thus we see the monstrosities of the warehousemen taste exposed in the leading street windows, and destroying by their vitiated forms, with hackneyed appeals to fashion, the taste of the public. Thus we see heroes, statesmen, men of letters sculptured in monuments of art, or pourtrayed in painting, carried down to posterity with proportion destroyed by drapery, sometimes overloaded, sometimes crimped, and always falsely balanced. Such are specimens of our taste in 1856, exhibiting in picture galleries, public places, and private mansions. To redeem the beautiful in draped forms the tailor must be elevated by art literature, and by practising in an art spirit modelling and design; he must come to an understanding with the refined public, and men of science and art, on points of taste, or the sculptor and painter must refuse to admit all that which is tailorised and mercantilised, and take to construct models of dress and drapery for themselves.

In the sense of elevating art, photography neither assists, but rather retards, as it copies most rigidly all the deformities and blemishes of the dressed figure; and the artist having no power beyond touching up what is before him, puts himself out of the sphere of creating a dressed form, nay, the element of art in creating a dressed or draped human figure, aesthetically speaking, becomes here lost.

That the human figure nude as well as draped is the primary element in cultivating taste has been said, that the mercantile mind (the mere seller) is incapable of creating or producing the beautiful, has been proved. But that the mind or soul is totally void of all sense for the beautiful is exemplified in the Jew. It is a curious fact that he from his mental constitution but a buyer and seller, can never be found proficient in producing even the lowest object in pure taste, and how far must he be then from handling the higher objects, as for instance, the human form itself or the draping and dressing it in an art sense. On the other hand, when he acts congenial to his spirit (a seller) he is always successful. In fact the mind to sell, having its fountain head in the Jew, if it turns to manufactures does so only to sell, not for the useful, neither for the beautiful, neither to elevate or refine, but simply to sell, and for gain alone. This mind is the essence working in mercantile manufacture; the slop spirit in opposition to the mind of art manufacture. The former is hard, cold, rapacious; the latter warm, kind, and liberal. Our mercantile age embraces too warmly and hastily the first, and stands too far aloof from the second.

If we however turn to antiquity, we shall see the origin of both these states. The Jew according to history was comparatively speaking from his earliest existence never settled; he was always a wanderer, and for that reason never cultivated art and science in statuary or painting. Still less did he hold sacred any elevated idea in such monuments, as did the Egyptians, Assyrians, and Greeks. Objects of this kind were too expensive and cumbersome for an unsettled wandering people. Hence no affection or pleasure for any ever so beautiful place or object of art, (the rapacious selling spirit has here its fountain head) when the abstract idea of one God in all the universe, unillustrated, was more portable and without cost. And so long as they could be kept together by the abstract idea of an all ruling unity alone, by which they were able to maintain power and amass wealth, it sufficed, until after a short life in Jerusalem they fell for ever on account of their own cruelty, and unyielding avarice against themselves.

But as man is sublime when his mind becomes undeceived and unbound from sordid selfishness; when all that is earthly is given up and he acts from the clearness of his understanding, as if by inspiration, according to the simple principle of truth and goodness; sublime as the sun when it left that unhappy vale and lingering stood, as if weeping and grieving to depart, glowing on the surrounding hills; infinitely more sublime, the infinite not being able to go out of himself, hence not severing himself from or going out of the universe, withdrew himself from a part of it (from a nation) and as pure goodness came to the world, so much the more intensely centralised, in a single man. A Claude is only fit to illustrate the scenery, a Phidias only to sculpture such a man. The sisters met and illustrated again to refine and humanise the world, by placing before mankind objects so beautiful in form and proportion, so pure in sentiment that a Gothic architecture only could form their fitting place. Michael Angelo, Raphael and others became masters and left us monuments worthy of their name; more followed in their steps, until insolent pride, superstition, and fanaticism blighted and destroyed, as sordid selfishness had formerly prevented the germination and growth of the beautiful in objects of art. Humanity mourning, stood leaning on this grave. Still it seems as if continuous life were made up of two opposing principles, which could not be severed; as if each side took its turn but to sleep. And after a struggle unlike man's, and yet by man performed in ghastly twilight shade, the conquering side appears more strong; beautiful in form and in thought we see the one, when in awful distortion we behold the other. So the Grecian muse of science arose from her serene slumber, in a form so fair and full of youth and active life. A critique of the mind as well as of the sense sprang forth. A philosophy of nature and of art dived into every branch which human head and hand could reach. Nothing was considered so little or so mean that high and noble minded men would not clear it up, in truth, in beauty, and in goodness. The industrial muse, formerly but a sister slave, rose upon the same pedestal with the rest, entwined with them in harmonious sentiment. No profane mind could insult the one without insulting all.

But, as Schiller says, "Just as we hope, ill has already befallen us;" swaggering impudence and insolent ignorance, combined with overflowing and undeserved wealth on the one side, and squalid wretchedness and its attendant vices on the other, step forth in hideous shapes. (Soulless trafficking Legreeism, the Christian has out-Jewed the Jew.) Art, science, philosophy, are insulted, nay, even religion in hypocritical action, under religious moral demeanour. The industrial muse sinks weeping from her pedestal, the sisters grieve and mourn. Noblé artists, give not portraits, but symbols in individual forms of principles working; because persons are but infinitesimals of continuous life in infinite time; feel not loathful in creating, but have charity with love and truth entwined at heart. Of this, then, the work partakes, always lovely to behold; it makes strong the hardest man to condemn his own wrong doing. Then, so true is the moral in human intellect to itself, that if it is only convinced of its mistake, and sees a truer road, it starts with an earnest and firm will to right itself again, even if it should stand before the world in a grim and blackened form. The most noble step forward first, and at length even the basest follow. It is as if there were a chemistry of mind as there is of matter. Two elements mix and intermingle, a third existence, unlike either of the two springs into life.

Thus, after much endurance and effort to redeem the fallen muse, a most noble step was gained, originating in the *Society of Arts.* It is the qualification bill. This qualification idea (element) is so genial, true, and ennobling to human nature, that it may be carried far into every branch of society, with the greatest good that ever could happen to a community. Every one would after this, according to his better mind, ask for quality, instead of, as is the fashion now, for quantity; and every manufacturer will stand aghast before his shamed out rule, "Work, eat little, sleep little, and die." Order, industry, and a sound manufacture in quality, and in an art sense, would be the result; learning with intelligence would work in harmony, and never more be seen intellectually dead human beings ground into tottering machines. Too low priced articles are intentionally made in many branches of industry to deceive, and to be got rid of but by cunning sale.

Artist, in that metamorphosis, where qualified human beings spring up out of unqualified raw matter, the sisters raise the fallen muse again, and never were such lovely and such happy forms seen to unite. There is a Phidias, there is a Raphael still to give the purest forms in noblest sentiment, as there is yet and ever was the infinite in nature, hence likewise in man fresh living. It is not then that the essential of man is dead, but that his senses are dim, his heart is but cold from viewing every object unceasingly with a mind of mercantile finance. Chase away that blinding centre point of wealth which weighs upon the heart; see the wonderful beauties in nature and art; absorb from each part the universal or unchangeable, revealing itself in the special, and once rightly seen, once in clearness, the mental sun will never set. And then a piece of, otherwise but industry, will rise to a piece of art. The industrialist will become an artist, and never sink into a slopper or trafficking manufacturer.

As all improvements must commence with ourselves after blending our minds with the noblest to be obtained; and as the human frame, nude as well as draped, is the nearest, and likewise the alpha in the studies of taste; it were well that an examination to prove qualification should be required, in the definite proportions and forms of the human figure, and in the construction of models for draping or dressing it, of those persons at least who are appointed to attire princes and nobles. Then these sciences, although primary elements of the art, and elevating to the mind, are so long treated as secondary, or not attended to at all, while persons can make wealth in slovenly ignorance, by merely being recommended from favour rather than on account of qualification.

For men of rank and wealth it is befitting to require the most beautiful in attire, just as it is befitting for them to live in mansions and palaces in the chastest beauties of art; in order to realise the abstract ideas of the true the good and the beautiful in every day life; to elevate mankind by beholding objects of the beautiful, as well as by employment, to create them in every branch of occupation. Nay this appears to be a certain duty of men intrusted with position, whether by rank or by means, or by both in society: because rank and wealth form but the lever for the end, *by right means* to elevate and ennoble. Hence persons have this lever but in trust, the owner of it is mankind. Thus the humble man, ennobled by his action and method of production, attaining position and wealth by right and proper means, will not more belong to the poor without soul, who live in cottages surrounded by fuschias and woodbines (as Cardinal Wiseman said) but he will be an intellectually good man—which is the highest religious eminence that blesses our race.

It is then clear how the smallest branch of industry consisting in forming and shaping should be connected with the fine art and scientific element. And although such be treated by a philosophical mind in abstract thought, still the mind must never be quite loosened from the real or natural; because mind governs matter, and can bring nothing to the understanding without the synthesis of both in certain forms, where the general idea of the beautiful particularises itself in the individual. For that reason, (keeping to the human figure) if an artist or a scientist in an industrial establishment observes how a person of taste is suited with the dress made to his order, he must mentally seize the essential (the normal form) of the entire figure running through all its parts; observe at the same time the collateral accidentals in the form of the figure, if such are present, but especially, excluding all whims which may mix up with true taste, respect every art feeling and scientific sentiment of it. So for instance when a person bends the arm much forward at the shoulder, and pronounces a garment to be faulty, because it wrinkles and feels tight, or when he throws the arms much from their normal position backward at the shoulder, and then decides that the garment is faulty in the opposite direction, from being too large behind and too small in front. These ideas are ignorant whims, because a magnitude (garment) cannot be in a definite ratio to another magnitude (human figure) and in the same time in a less or greater to it. It is not and must not be the object of the artist in draping the real figure to fit various postures of the figure in the manner described; but it is the most decided aim to fit the natural or physical posture of the figure without mental attitudes or actions. If however the person observing the preceding, requires that the garment shall fall naturally, unstrained, neither sacky, but in parts as well as in the entire harmonise and be becoming to his figure, and shall be under these conditions close, easy, or loose, then these are demands which must be respected and fulfilled. Every garment made to these conditions is beautiful in whatever graceful posture the wearer throws himself, and the creases or folds appearing in such a posture are the very same which the sculptor and painter have most carefully to study; because a figure so draped is chastely beautiful, especially if a model of perfect proportion. Besides this, such folds or plaits at suitable places on the figure indicate movement corresponding with life.

Respecting quantity in dress, (close easy or loose) the artist in draping the real figure pays it his most scrupulous attention. Here is one great point of his art, namely to catch in his mind, by the observation of many cases, what best becomes the one or the other form of the figure in size and style. His mind must here be creative in the same time that it is imitative. To insure success he varies styles and tries different sizes, and marks them carefully on the models for the garments. From this creative practice sculptors and painters may convince themselves it is not always wise to imitate what they see in the draped or dressed real figures, but rather to be careful in choice, and create and furnish themselves with their own hands, true and correctly draped models. Here Michael Angelo was scientific, persevering and industriously great. And if it is now evident that the sculptor or painter should design his models or drapery to the model figure from his superior knowledge, how positively should he abstain from imitating the mere tailor taste, and infinitely more abstain even from looking upon a suit of apparel produced but for sale or in the slop spirit.

There is one cape model for draping the female figure on Pl. V, namely fig. 2, which is the most fitted in casting drapery. It must never be taken of a less angle for artistic purposes, but it may be of a larger than is here given.

There is another point to be borne in mind connected with every model, whether it is for a male or a female form, namely, the putting together of the parts of the garment cut out after the model. In this unskilled, indifferent workers make very gross blunders, whereas among the well-informed, and those who have a pride and pleasure in their handicraft, surprising perfection is attained. There are then sometimes faults committed by the workers in closing the different parts of the garment, which blemish it, mistaken for faults arising from the model. It may be inferred from the foregoing portion of this article that the form of the figure may be misunderstood, and likewise that an incorrect size be taken of it, which, of course, would cause the model to be wrongly constructed. In these cases the errors of the artist or scientist (the modeller and designer) must be carefully distinguished from those of the artisan (the worker). Should the incorrectness occur from a wrong construction of the model, it is only to be rectified according to form and size of the figure; but in case the faults should originate from the putting together of the parts, of course they can only be corrected by adjusting them, not by any alteration of the model. The artist and the scientist know how to distinguish these faults from each other; but the common practitioner, not seeing where they lie, alters the model indiscriminately. Thus we see in some industrial establishments patched patterns, handed down from year to year, of which the maker himself is as incompetent to give a proper and clear explanation as the paper of which they are composed; because, all traces of the guiding element have become completely lost. And thus it follows if the common practitioner becomes vague and indeterminate, losing the power of constructing and designing, he most frequently gives up exerting himself, and, deservedly, loses his customers, who, according as they are of a better and higher class, are the sooner gone.

The sculptor and painter may infer from this that whenever parts of drapery shall be put together for a model figure, he not only has to construct the model, but likewise to direct the worker to place them in proper and correct balance; that is, the parts must fall naturally to one another in the garment, similarly as the model is constructed, and not be unduly and unequally strained or puckered. An artist, from his superior knowledge of the human form, may easily undertake to direct this part, with the most satisfactory result.

It may here be observed that in some countries men of rank and wealth, with highly cultivated minds, and having a desire to maintain and extend the culture of art and science, in common or every day life give stimulus and vigour to them by rewarding the tasteful in modelling and designing, in proportion, beyond the value of the material. The mere fabric of the dress is with them secondary; the form, the becoming, the suitable, are primary. To demand a good designed and well constructed model of one's own form separately, for a garment, has been proved to have good influence; as through this is detected who is an artist in draping or attiring the real figure, and who is not, besides which by such means the art and science of it is kept in useful exercise.

History gives us records that even princes and princesses in olden time became initiated in some handicraft; and it is equally true that the designing of handicraft articles, and the sciences connected therewith, are in our own times learned by many individuals of rank and wealth, as suitable to our progress as the mere handicraft of them was to former generations. Lastly, it may be evident from the perusal of this paper that, of all sciences and design in technics, none are more suitable for minds loving and striving for the beautiful in form than the very same here brought forward; because they give a deep insight into creating models for fine art studies, besides a knowledge to distinguish clearly the artist in draping the real figure from the common practitioner who clothes us, and assist to discriminately reward this branch of industry where reward is due, and withhold it where it is not deserved.

MODELS FOR LOOSE OVER DRAPERY.

¶ 21.——On Pl. 6, Appendix, fig. 1, is presented a hunting cape model, which is well defined by the proportion numbers. The length A B is various, but it is generally 36 inches. From the forepart a considerable piece is taken off, as C D E defines, so that the arm may easily pass through. The two parts, that is hind part C E, and cape, are put together in C E F, over the shoulder, where they are of equal form. It will be seen that C E F G is but a part of a cape, covering only the chest. And also it will be observed that this model is constructed single breasted in the forepart, but double breasted in the cape part; such however is optional; its length is allowed to fall upon the hand to F if the arm is pendent. The model answers equally for ladies or gentlemen, if attention is only given to construct it by a female proportion measure when intended for a lady. This model, fig. 1, is constructed by a male proportion measure, fig. 2, taken here of a size which accommodates itself to the plate, but which in practice is naturally determined by the size of the figure in the manner stated in my work of systematic instruction in over garments.

¶ 22.——Fig. 4 presents a model for a Russian poncho. This however can scarcely be termed a model, as there are no proportions defining the parts, and therefore no science in the construction of it. This garment is produced in practice by merely taking two straight pieces of material, which must be of a length when cast on the figure that the corners touch the ancle. The pieces being joined together in A B, have an opening left at C for the head to pass through; the four corners have each a tassel.

But this rough kind of garment looks picturesque only on those who understand how to wear it. However this loose and shapeless wrapper which has little more to recommend it than the folds produced by holding a sufficient quantity of material well on the figure, has found its way in various countries. The German poncho as presented in fig. 3 is a modification of the same. Its length A B is various, suiting the choice of the wearer, but generally A B = 36 inches. The construction is as follows:—draw a quarter circle from the point D, with a radius of 4 units = D F; draw the chord of the quadrant, halve it and draw D E. Draw a second chord E F, halve it, and draw D A to C: draw from the point A, with the length A B, taken as a radius, a circular curve B C. Now let fall from the point A upon D G a perpendicular A I; and the proportion numbers define lastly the drawing by free hand of the collumial lines A H for the hindpart, and A E G for the forepart. This forms then a model for a German poncho, which is in reality no more than a sort of cape, flattened in the front and behind by the collumial lines A H and A G, deviating in position from the first quarter circle. Thus is thrown as much more fulness on the shoulder, as the curved surface lost behind and in front in the construction.

The German poncho, upon being introduced into England, underwent a change, and was reduced to the cramped form A K L for the sake of economy in material; and in this manner it has sunk to a merely necessary tasteless covering, a simple wrapper for travelling, ruder in form than it was originally, having been robbed of the quantity required for folds.

¶ 23.——The remainder of the models on Pl. 6, Appendix, are all loose over garments with sleeves. The one shewn in fig. 5 is constructed nearly like that in Paragraph 17, Plate 4, Appendix, and there termed a Spanish sleeve cape model; later it has received the name of vertexial sleeve cape; because the sleeve goes with its highest point into the vertexial point of the figure. Still later this model has been changed into the form given in fig. 5, Pl. 6, Appendix. The Axilla incline A B has no seam, it is creased and folded over in A B as A C B illustrates, and then put together with B C in B D. Thus there is but one seam in the forepart running from the vertex B to the fovea axillaris D; and when E is put together with D, the arm hole E A C is obtained, into which the adjoining sleeve part of the model is inserted with its joint F in the forepart E; whereas, previous to this D K joined with E L. But care must be taken that the hindpart M G of the sleeve goes in the hindpart of A E, and the front M F of the sleeve in the front of the arm hole.

The construction of this model is in every part by itself evident, because the proportions define them all unmistakably clear. It is necessary to observe that $E D = K L = 1$ unit: on account that the length A E behind, over the projection of the scapula on the figure requires one unit more than its corresponding length in the forepart; and for that same reason the sleeve part must have more length behind than in the front, and G I must be made to fit F H, by holding on G I in the elbow, and stretching out F H in the same place. But although this style of garment is much liked, the vertexial cape above mentioned is just as much in demand.

Fig. 10 presents an officer's vertexial sleeve cape model, which can be perfectly understood from the proportion numbers and the preceding Paragraph 17, on Pl. 4, Appendix. However some few points may still be attended to. First the entire $A G = 10\frac{1}{2}$ units. Second, the back part is behind $\frac{1}{2}$ unit lower, and the forepart in the front of the neck hole (collumial line) $\frac{1}{2}$ unit higher than the same points in fig. 5. It is necessary to make such a difference in the parts, to cast more fullness round the shoulders and behind. In the ordinary vertexial cape the vertex of the fore and backpart is situated in P, but in this model it is placed lower, as the empty space of P O shews; but this deficiency is made up by the broad top K, of the sleeve part. Farther $H C = 1$, and $C F = 1$. But the point C of the back part being situated one unit higher than the point H in the line A H, and the point F of the forepart being two units higher than H is, on account of A H being greater in this than in other vertexial cape models. If this were not observed, O C would be too large. Farther, H D is made equal to A B, and C D is put together with E F.

It may also be remarked that I K of the sleeve part is greater than would fit exactly in the fore and hindpart; but this excess of height has been taken for the purpose of holding L and M on full over the shoulder, in order to allow room for the epaulettes. If none are worn K I may be taken so short that it is not necessary to hold on in L M. The entire length of the model is generally from 40 to 42 inches.

Fig. 7 presents another officer's cape model with sleeves, which is of quite a different description to the one just explained. The length E B is in general 45 inches, and the width in $B C = 35$ inches. The construction of it is as follows:—first, the ground piece H E A F G as the proportions define; draw the collumial line H E of the hindpart, and that of the forepart by free hand; after this move the ground piece in such a position, that when a right angle C D I is drawn on its base D I in D, the leg D C may comprise no more than $C B = 35$ inches. The length of the leg $D C = A B + 3$ units, $D K = 1$, and D C is put together with K L. The curves M K and M D are drawn by free hand.

The sleeve part accompanying the model, and belonging to it, is clear from previous instruction, and so likewise is the small cape, which is however risen high in the front above the dotted circle as much as 1 unit, and projected proportionately in front downward, beyond the usual boundary; in order to produce more fulness than there is in the plain and simple cape model. This small cape is usually from 19 to 20 inches long, if put on a cloak cape, but often more or less than this number, according to the decision of the wearer. It is the same which is put on the other officer's cloak (sleeve cape) fig. 10.

¶ 24.——Going back to civilian drapery, fig. 6, is another style of sleeve cape model. The construction of this model is likewise easy, as seen by the defined co-ordinates. Its length $G H = 36$ inches in general, unless such is expressly defined to be longer or shorter. After the proportions A E, E F, &c. have been laid down, and the A B and C I have been drawn, then A B is made equal to the length, taken from the vertex A of the figure to the knuckle of the hand when the arm falls straight. Now draw a circular curve B I with C B from the centre C; in I draw a perpendicular, $I K = 6$ units to C I. Draw a second circular curve K L with D K from the centre D; and the curve B K by free hand. Lastly, draw a third curve B M with D B from the centre D, and the curve N M out also by free hand. Likewise draw the curves O M and O K, both by free hand. These two latter O M and O K are joined together, and so have the appearance of a true, as well as a wide sleeve. That G O K presents the forepart, G H A B K the hindpart, and lately O A B N M the apparent sleeve, must be evident.

Another model, fig. 9, presents a less wide, but in the same time a real sleeve in one with the body, the construction of which is so simple that a description of it is scarcely necessary. However it may be said $CD = AB$; and that the point A must be put together with the point C; and C D joined with A B. Farther, that F E is joined with E C, and lastly F G with A H.

The most recently introduced sleeve cape, or wrapper model, whichever it is termed, is presented by fig. 8. After that the proportions have defined the parts, draw by free hand the curves F C for the hind-part, and E A for the forepart. A B is joined with C D. The sleeve part belonging to this model is the same as that accompanying fig. 7.

The small collar, fig. 11, belonging to each of these models has been described; it is usually from 3 to 4 inches in breadth, seldom more; but its length is defined according to the collumial line of the model to which it is attached. The small proportion measure, fig. 2, belongs to all the models presented on Pl. 6.

Fig. 12 is a design of an Arab bournous (more properly burnoose). This figure can decidedly not be termed a model, as it is the most raw article of covering, and one which the rudest savage might design. Take a strip of material F G as long and broad as is suitable to the height of the wearer. Put on one side in the middle of the length a square piece A C D B, loose, except where fastened together at A B, and about 28 inches in length. Put C E together with E D, draw it over the shoulders and it forms the garment. To make a variety in it, hook the points A and B together; throw it over the person, and A B D C will hang loose behind like a sack ornamented with tassels at the corners. Like all primitive apparel the bournous is worn by male and female.

Although this is a most raw design, springing from a most primitive mind, the free and unfettered idea is not to be scorned. It is in design as in poetry that such free ideas are preludes in the savage mind for better things. It is an endeavour to lift itself up in both cases, expressively though dimly, often powerful though rude, towards the good the true and the beautiful. Better minds, nay it can be truly affirmed the most cultivated and learned, and the deepest thinkers often descend from their elevated standard to the most primitive of man's probable earliest natural ideas, to give a true and unassailable base to the finest structure of years of meditation. Holding true to the foundation that the edifice may be firm.

POSITION OF THE PARTS IN THE AXILLA.

¶ 25.——The folding model of the thorax developed from a figure model has been treated of in Anthropometry, under Paragraphs 18 and 19. It was there sufficient to go only as far as the normal form required. Here however it may be desirable, for certain cases in practice, to know the different positions the axilla may take under certain conditions, and likewise where the limits of its various positions lie. We do not wish to give direct synthetical instruction on this matter, but rather to treat it somewhat philosophically, so, namely that every student may reflect and decide for himself according to his own conviction, what position the axilla may most correctly take, harmoniously with the corresponding part of the figure in the thorax.

From the above-mentioned paragraph 18, we are already made acquainted with the evolvent, but it may be well in the explanation of the fig. 1, Pl. 7 Appendix, to bring it again to the mind. Construct therefore the thoracial part of the figure first, according to the rules in Anthropometry, with its axillar section A B C. Agreeably with these the diameter of this section is $AC = 5$ units, and as the entire circumference of its circle is calculated in value equal to $15\frac{3}{4}$, so may the quarter of it, B C, be taken equal to 4 units; quite near enough for the present purpose. Make the tangent $BD = 4$ units; divide B D at liberty into equal parts, say into four. Divide also into the same number of equal parts the quadrant B C. Draw E F, G H, &c. on the radii I E, I G, &c., and make E F, G H equal, in order as they follow, to 1, 2, 3 parts of B D, namely G H = 2, E F = 3. Draw by free through the points D, F, H to C the evolvent D C; then is its radius H G = G C; the other radius E F = E C; and the third B D = B C. Of this geometrical truth we shall make some use, namely in defining the axilla line in the model developed from the thorax.

¶ 26.——See fig. 2, Pl. 7 Appendix; here are three positions of the front part of the axilla; L M D is one, and in the same time the most perpendicular which can possibly be drawn, because the greatest distance of the parallels A F and L I is A I = 10; and the vertexial point M of the axilla is the nearest forward it is possible to draw; see Anthropometry, development of the thorax. Hence this is the limit of the perpendicular position of the axilla. N O P is a second position of the axilla, and the most inclined which it can be made to take, because the acromial point O of the axilla in the model, lying in the evolvent C F, can never be in B F, and lower towards F it can neither be situated, as the vertexial point N would then move so far back, that P would be unnaturally far from the sternal point K. Hence this is likewise the limit of the inclined position of the front part of the axilla. Between these two limits of the axillar position of the model, there is a third one, namely G H K; this is termed its normal position. Besides this latter there may be drawn infinitely more; on the one side the inclined, and on the other perpendicular ones.

Let now the enquiring mind, after many experiments, decide which of the positions that the axilla is given in the model suits best; but bear in recollection that the clavicular line L D = K H = P O = 8, must remain under every position the same in magnitude or size, namely constant, that is according to the proportions in Anthropometry. The vertexial points N, G, M, have their limits so that N is the lowest and M the highest in position. Likewise L I = I K in the two axillar positions M and G. But in the inclined position of the axilla N P O, the sternal point P takes its position so high, that if I P is drawn P I > L I. Hence the axilla has too much surface in P K, in this case, and hereby is very close in the surface of the pectoral region E. But the reverse takes place in a perpendicular position of the axilla, namely, the pectoral region in E becomes full in the surface. However if the sternal part of the figure is much projecting, and consequently the acromion of the scapula much receding, then the inclined position of the axilla is preferable. But generally, the normal one is the best.

Fig. 3 represents the normal and the inclined position of the axilla with the proportion numbers as required in practice. And fig. 4 represents in addition the perpendicular form in position. It may further be observed that the more backward the axilla part of the model is placed, the lower is its acromial point, see D, H, O; and for that reason the point must be still more reduced under the same condition in fig. 4. The reverse is to be observed of the point A' in the forward place of the axilla; still experience shews though the axilla is placed forward, and the point A' high, this point must be kept proportionately rather low. For example see fig. 5, if the inclined B V is placed in the position C V, and in consequence, when the hindpart is placed the resultant line D E is produced. Still the point A, as resulting from the position of the hindpart in B V, is more desirable on account of its pleasing result in the form. But the curve E A, drawn by free hand, must touch D E in F, in the half of its length. Thus the position of the two curves F E and E V becomes defined by the resultant D E; but the curve F A by the first resultant A E. These relative positions of the points A, F, E, take place in every position of the axilla, whether it is backward, forward, or normal. It must be borne in mind that these experiments in the positions of the axilla relative to the other parts of the model, are made in one and the same form of figure, perfect in proportion, and normal in position of parts; it should be understood that experiments are made only on figures of middle proportion ($h = b$) when primary facts of this kind shall be settled.

The position of the side part on the model in figs. 2 and 3, is the same, which by examination soon becomes evident; the student must not be misled, because the quantity of depression is Q R = $3\frac{1}{2}$ in fig. 2, and only $1\frac{3}{4}$ in fig. 3, This difference arises from the different positions of the backpart, as is clearly seen by a comparison of them in this respect; and considering that the dorsal length of the hindpart in fig. 3 is just so much increased $6\frac{1}{2} + \frac{1}{2}$, as the lumbar length in it is decreased, $8\frac{1}{2} — \frac{1}{2}$, the side parts could have neither changed in length. Thus the side parts in the two figures are the same, and the side curves remain with them unchanged.

But a variation in the side parts is possible which will change the form of the curved plane, see fig. 4. Here the side part is placed with its lower end in the extreme point Q, and as $BQ + QC$ must be equal to 7 units, wherever Q may be situated in case CQ is taken less or more than 2 units, the quantity of depression, otherwise falling between Q and the side part, has now its place in B E, and the line D B is drawn. The surface of the side part has now become less curved in the lumbar region Q F B. By adding however in this case ½ unit at the very most to the side part in the scapula point F, it preserves the normal side curve, but becomes in D fuller in the surface.

We have then in figs. 3 and 4 illustrated the two extremes in which the side part may be varied in the lumbar depression. As now the distance $EB = 1\frac{3}{4}$ in fig. 4, and the distance of $QB = 1\frac{3}{4}$ in fig. 3, it is evident that the position of the side part of Q B in the lumbar depression may be placed more or less towards Q, or from it, towards E. Hence a great number of variations may here take place in application.

On this principle the model fig. 5 is constructed, as the side part with its position, and side curve G H I clearly indicate. In this model there is only needed the wedge K L M to be inserted in the section O P. The remaining portion is by itself evident, and requires no farther explanation.

ON PRESERVING MODELS AND DESIGNS.

This is a question which it is incumbent upon me to put in such order that every one whose mind is not clear on the subject may be enabled to come to a decision.

At first it must be understood that the question is not one of designing and constructing models, that is, of producing forms, but merely whether certain forms produced for practical purposes shall be destroyed after once being used, or preserved for a second or repeated use.

This is, curious as it may appear, a subject which has put practical men of one and the same profession into stern antagonism. The one positively opposes what the other, on this point, just as strongly upholds. It is moreover remarkable that such antagonists are not only to be found in England, Germany, and France, but they are to be met over the whole world in every important town; and still stranger is it that they should carry it out in such a manner as to work to their own disadvantage.

It would be desirable, if it were possible, to bring this matter so before the mind of every well-meaning and intellectual man, that such antagonism may vanish and harmony be introduced among those in dispute. Scarcely would such a dissension be worth any notice here, had not the conflicting opinions operated upon the artistic and scientific element in modelling and designing; namely in degrading and lowering it, merely from an obstinate opposition on both sides. First, let every person interested, pause and reflect, it will soon become clear that if the design or model is saved after the order according to it is executed, it would prove valuable when certain particulars are marked on it, which before hand might not have been known; and farther, in the case of a second use of it, with the assistance of these remarks and notes respecting size, form, &c., one may be rendered more critically perfect. Second, models and designs preserved in an establishment are valuable as an actual property to a successor, for without such a possession he would only receive the mere skeleton of the establishment without the soul. Third, in very busy seasons, to use the models or designs again, when time does not allow of their being constructed entirely afresh, or when the interval from the time of their construction is not sufficiently great; or the change in style not sufficiently prominent. Lastly, they may be valuable when saved, likewise for the sake of comparison and information as to progress, and to shew the height towards perfection reached in designing and modelling. To save them for a year or two is advisable, and also never to destroy one before a more perfect substitute is obtained. All these matters should be conducted systematically, and not broken off or disjointed. That this has actually been done by energetic business men without any mystery, is an established fact, and can therefore be admitted without contradiction.

But those persons who are altogether against the saving of models and designs, must have the abuse, and not the right management of these things in their minds. The abuse of them is in keeping them too long unrenewed, arising from a want of proper knowledge on the subject, or from inactivity, or from shortsightedness and narrow-minded selfishness. But an artist and a scientist never commits himself thus, for to him the ever-working law of nature is clear: continual renewing, in order to maintain a continuous vigour health and beauty, up to the normal state. Miriads of inductive facts are examples, displayed before us every moment of our existence. It is in all things so, nay (speaking philosophically) even in death; should it then be otherwise in the management of those things which have become an element in the industrial sphere? What a sloven in an industrial establishment abuses cannot be brought into the argument, as such a person is not taken into consideration. By neglect and inattention, men may bring their own being into a degenerate state, how should they then not more likely bring their models and designs into the crippled condition of poor patterns? If such patterns and faulty imitations are termed models or designs, and such are in the minds of those who are opposed to the preservation of them generally, then indeed they may justly oppose their construction or design, and even more so that they should be preserved. We see then how one thing may be substituted and taken for another, in the absence of all true knowledge, merely on account of its external similarity. Thus we have known industrial men quite abhor the idea of being taken for mere copyists or tracers, instead of artists, on being seen with designs on paper in their hands, by those who could not distinguish at sight the model from the mere pattern.

True, if things so obtained were received as models and designs, it were better that an industrial professionalist never saved one of them. It would be decidedly preferable at once to make the design or model on the material, and which would not extend beyond the object manufactured. Then at least, as it appears, the art would be continually cultivated in manufacturing practice by absolute necessity, so long as there were a demand for any productiveness. But alas, this method has been long enough tried and abused to the utmost; it is actually the most primitive one in all handicrafts, and has most lamentably kept in the rear instead of advancing. It is by this means that men have excluded all science and art, and have sunk into blindly working by the rule of thumb. It is by this method that the handicraftsman or mechanic in proud ignorance boasts of experience only, despising all mental and reflective guidance, and with it all science, nay, all literature, not even respecting that which is designed especially to elevate his own handicraft to an art, on a scientific base and artistic principles. Lastly, it is by this methed that men by an empty boast of experience sink into a soulless and mindless empiricism, merely picking up unconnected trifling facts, disordered and confused, in truth, by which men sink below the very machine; for the machine, though blind and without reflection, at least has order.

Now it may fairly be questioned whether on this side of the matter which we have in discussion there is no abuse. True, it may likewise be said as above, that men sinking thus low their industrial profession do not belong legitimately to our argument, and for that reason only such should be admitted on either side, as elevate themselves by the manner in which they carry out their profession. Be it so, and we need only to deduct from each what is impure and mean, and embrace that which remains pure, and which is in our argument the art of constructing and designing models according to scientific and artistic principles, whether they should be preserved upon paper, &c. or whether to be destroyed in the article, in the progress of its manufacture from them. We see then clearly that we should not attack the good and valuable element (modelling and designing) in one or the other method, but endeavour merely to eradicate the abuse in both. Artists in either method would naturally unite in support of the universal and true portion of art and science in their profession, by which they are unmistakably elevated and respected, against the illegitimate proceedings which degrade it by abusing its science. Thus harmony may be restored among reasonable, intelligent, and good meaning men, although they were antagonistic.

Be it remembered in every case, in which any confusion is committed to a careful analysis, order and right understanding will be restored; so has it been for instance with the scientific art of modelling and designing. Thus after some sifting and reflection this art is, in the more advanced industrial establishments, as being an intellectual function, separated from the merely mechanical one; similarly as there has long since been a separation of the mechanical handicraft from the merely unskilled day labour; and as still farther back the purely scientific has been separated from the applied. All this is in order that the divided functions may be more perfectly performed in practice; better learned and better instructed, as a practical theoretical, as well as pure science, which alone gives practice a sound base. Similarly as the architect superintends the mere builder, the modeller and designer superintends and directs any other industrial manufacture to which scientific art is applied. And the same can be done in every industrial branch, for none exists which has not its science. External anatomy, preparatory to anthropometry; and anthropometry, signifying the different proportions and forms of the human figure, are the true sciences upon which rests the art of constructing and designing models for draping the figure, if the method adopted is mathematical, which alone forms the sound ground work, not only for this, but for many other arts. Farther it is commendable that we should adopt the scientific element as a test stone, and are not indifferent to the rectifying and improvement of methods in each of our respective arts; because, " indifference is the mother " of night and chaos," unless it be a momentary slumber for renewed strength to better action. For this reason, a little warm discussion is decidedly preferable to having no argument about the matter at all. Some men, it will be observed, will enter into a discussion of this nature by arguing that " every thing is good " enough," that this or the other " will do well enough." Some others again argue in a reverse tone, and ennoble and elevate the most insignificant subject by their language. The former carry the influence of destruction, the latter that of renovation. Life always conquers in the end, nay, it germinates even out of death. For this reason, whoever feels himself possessed of the life giving element never desponds under the most adverse circumstances, for he knows his power. Hence again the well-meaning agree, although perhaps meeting by different methods, in the true, the good, and the beautiful. If so in the general, why not in the science of their especial arts? For all science is linked in one continuous chain.

If, in conclusion of the argument, we apply especially the idea of rectification in the scientific art of mathematically constructing and designing models for draping the human figure; then it must be evident to the artist in draping the real figure in an industrial profession, as it is convincing to the artist in the fine arts' profession, that both would unite in the scientific points of external anatomy, and forms and proportions of the human figure; as being equally desirable and necessary to know for both professions, fine and industrial. What reflecting man would not see that if an entire in height and breadth were placed before him, consisting of several parts, natural to that specified entire, such parts must be in harmony to each other and to the entire, if the entire form in its kind shall pass as true and beautiful. And if so, then the philosophy of form, first, points such out in nature; second, in art it decides and defines these parts into a harmonious entire, if possible, above nature. Such is the science, and the scientific elements which reflecting and thinking men are looking for. Again, men agree in the scientific and universal, although such are revealed in the most special; because there is no special without its universal, which links all.

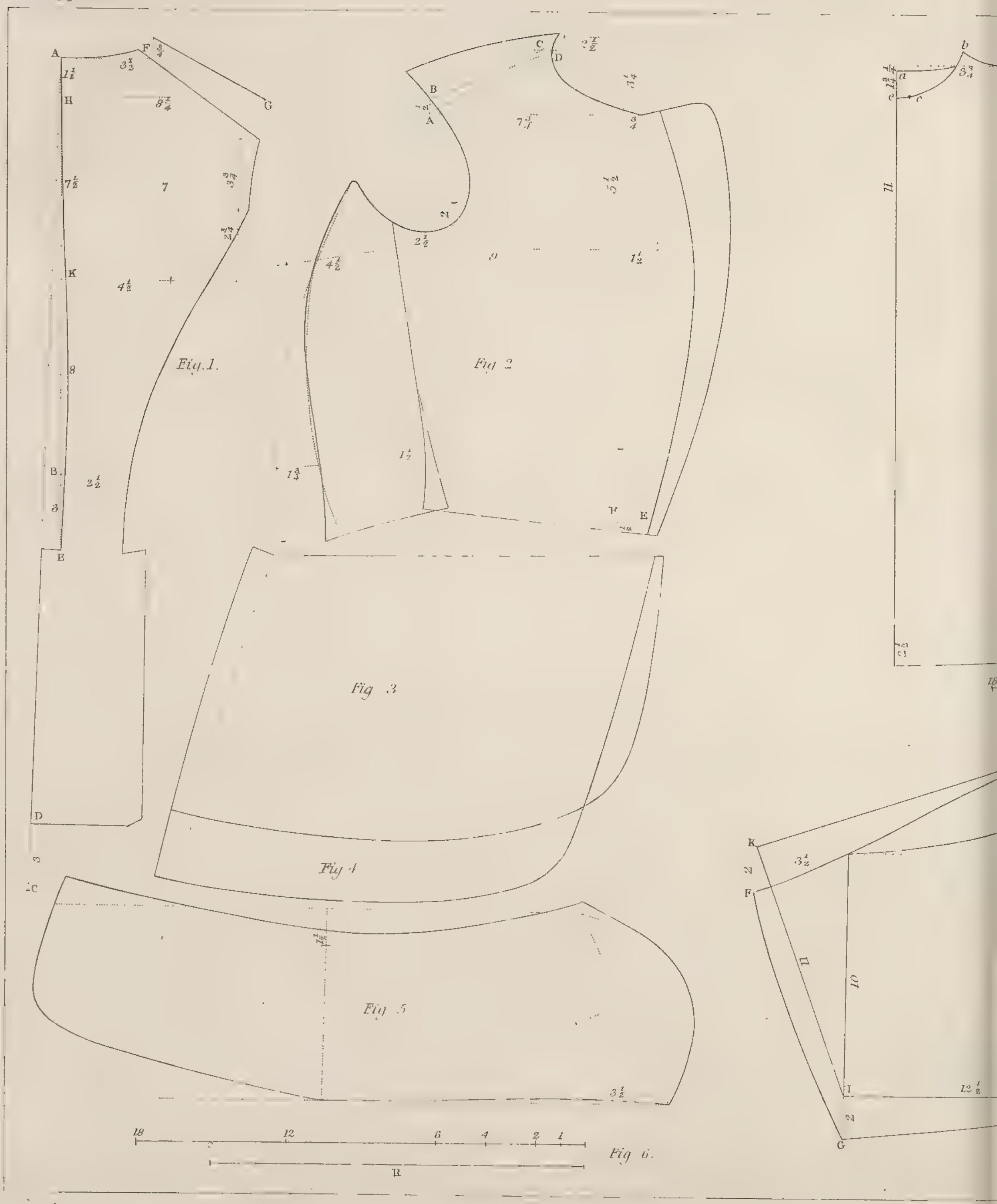
For this reason, all men are from the nature of their mental constitution united internally or intellectually by the universal, revealed to them on special surrounding objects, which coming in contact with the senses, stir them up to consciousness and reflection, and then with their own endeavours they follow the true path of thought. And thus it is evident, if the mind is not by merely selfish motives forced from this natural order, man is always intelligible and true. Moving on in such a course with earnest industry and true love for his occupation, whatever it may be, lead him steadily and certainly forward to excellence, to the envy of the slothful and immoral.

The natural order in a profession chosen with an earnest regard, is to study steadily and systematically, first, the scientific elements of it; view the scientific principle in itself true, to be suitable in its application; second, adjust such by application, that theory and practice may harmonise; third, search by self thinking deeper, and never retrogade, but progress; so that the better may be continuously produced.

If we at all times held unconcealed and open in practice, the same as in pure science, to natural and true principles in scientific order, without the intermixture of interested views, so that we might see from the same centre the moving spring, out to the same end, none would be in opposition to the other, but all would act in harmony for the welfare of each and the entire, in proportion as each has his position. Thus it was the Greeks came to perfection.

But as soon as self interest conceals the leading spring of movement for hidden ends, in whatever occupation or office it may be, the untempered material, or raw physical will soon overbalance the intellectual, however excellent, and draw the whole to destruction. A mere augmentation of the material without the mental and moral to preserve a proper balance to it, is what no wise and good meaning man ever would desire; because by the immutable law of truth and justice he would fail.

Pl. 1. Appendix



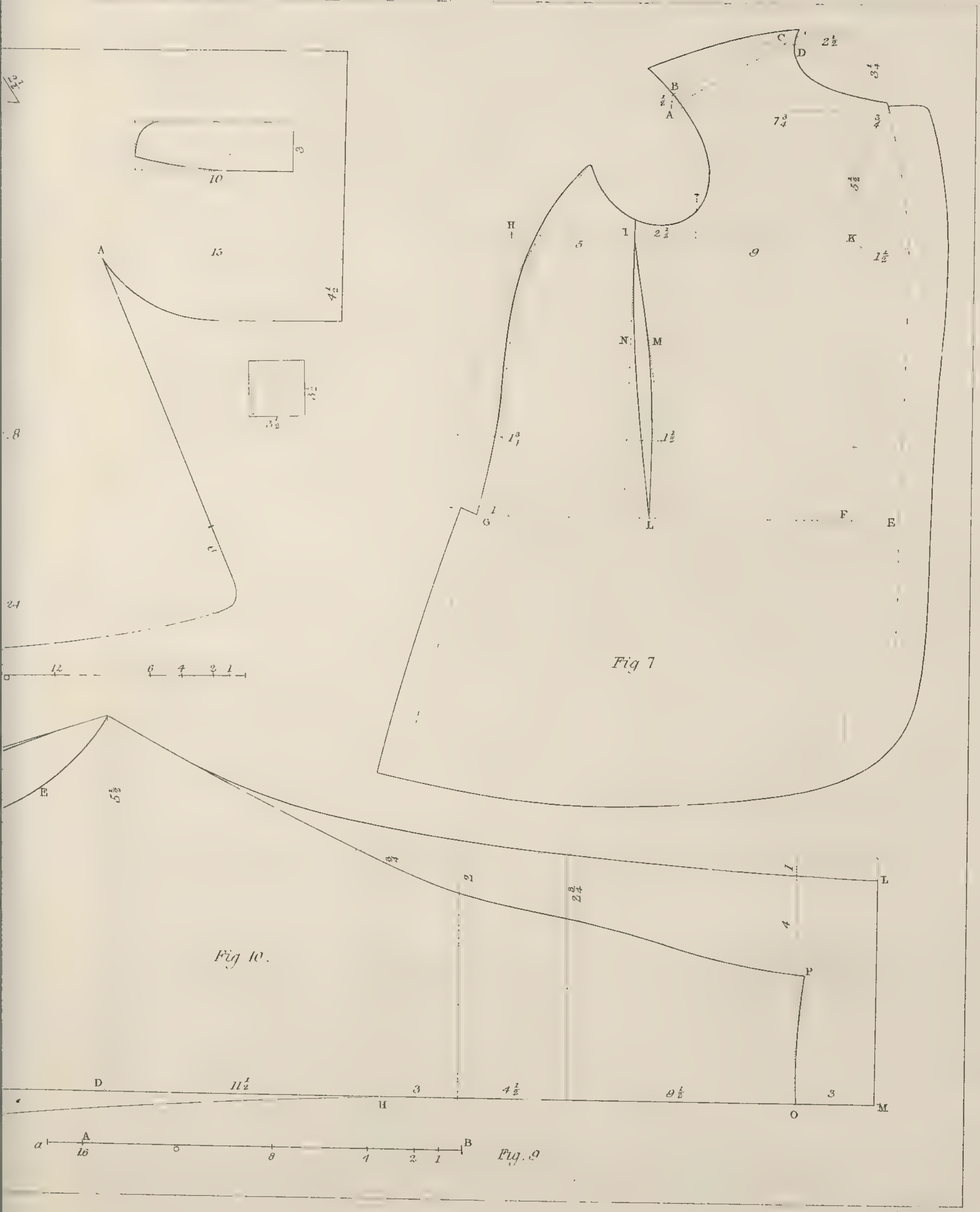


Fig 7

Fig 10.

Fig. 9

J.W Lowry fc.

Pl. 2 Appendix

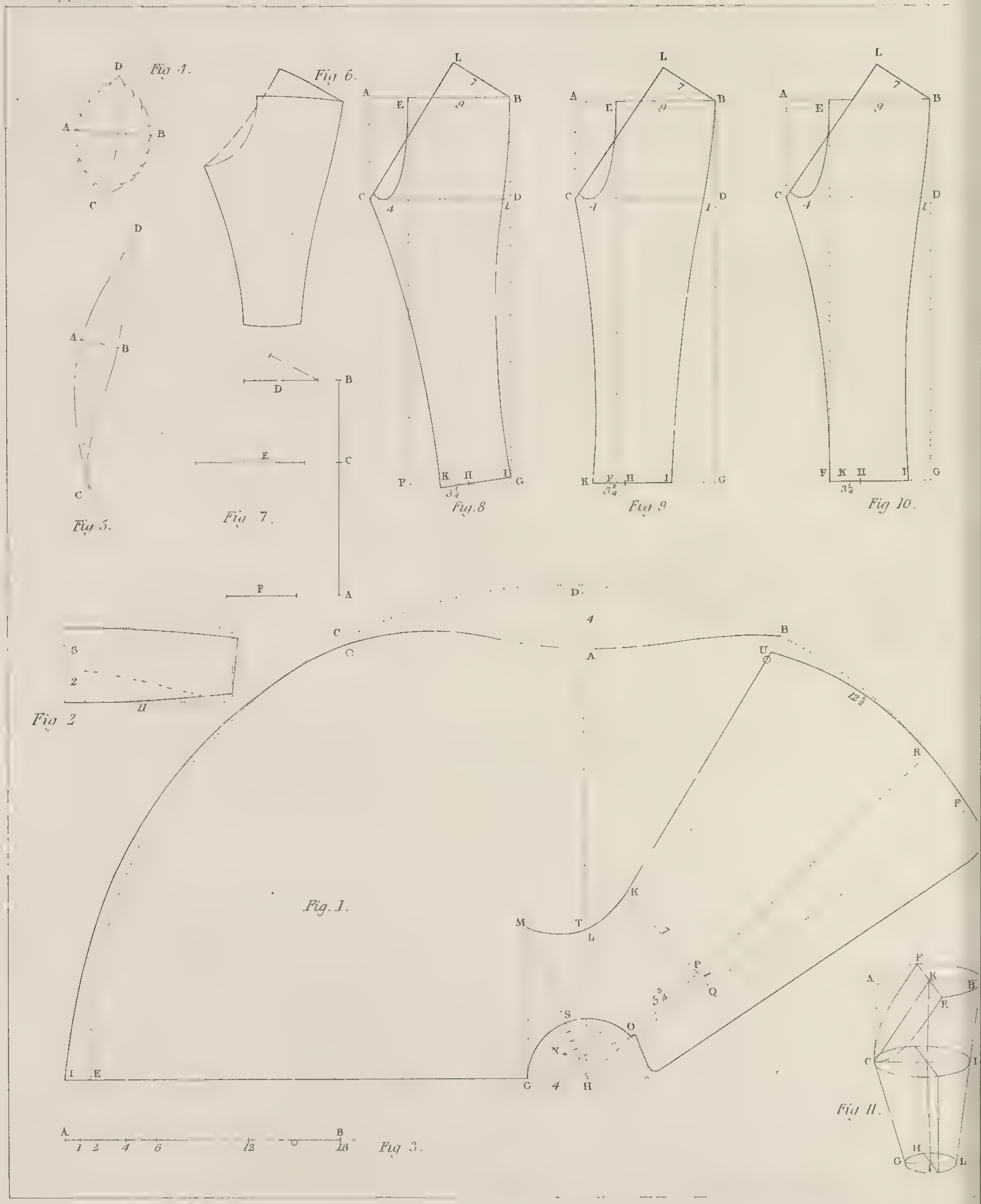


Fig. 1.

Fig. 2

Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8

Fig. 9

Fig. 10.

Fig. 11.

Fig. 12.

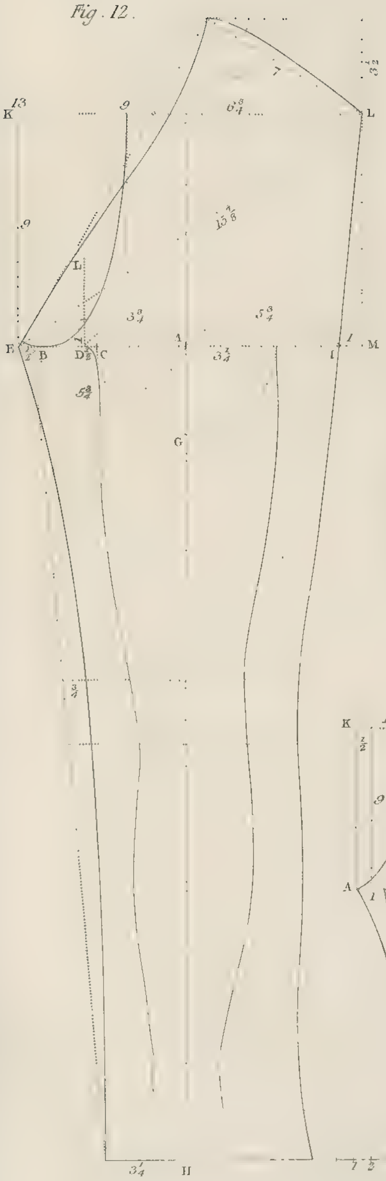
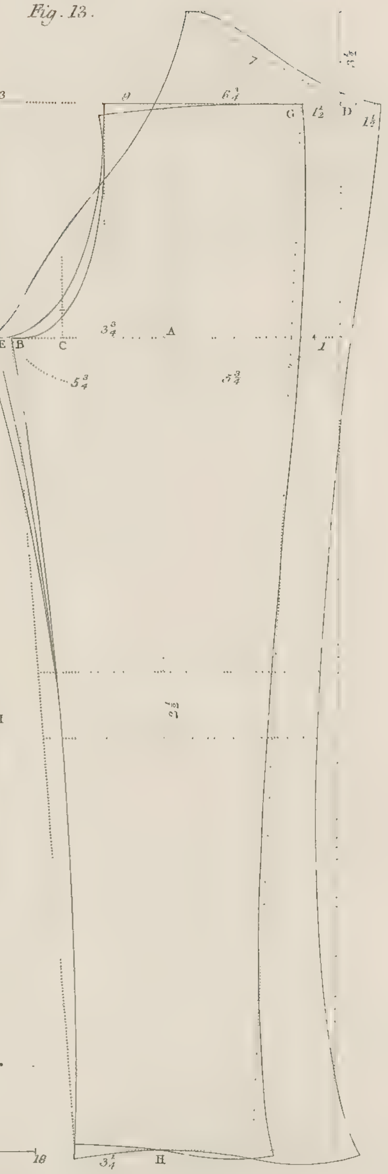


Fig. 13.



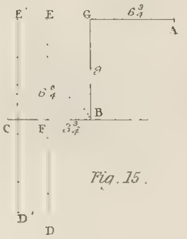


Fig. 15.

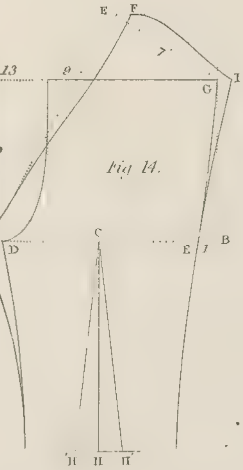


Fig. 14.

Fig. 16.

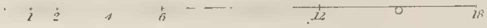


Fig. 17.

J.W. Lowry fc.

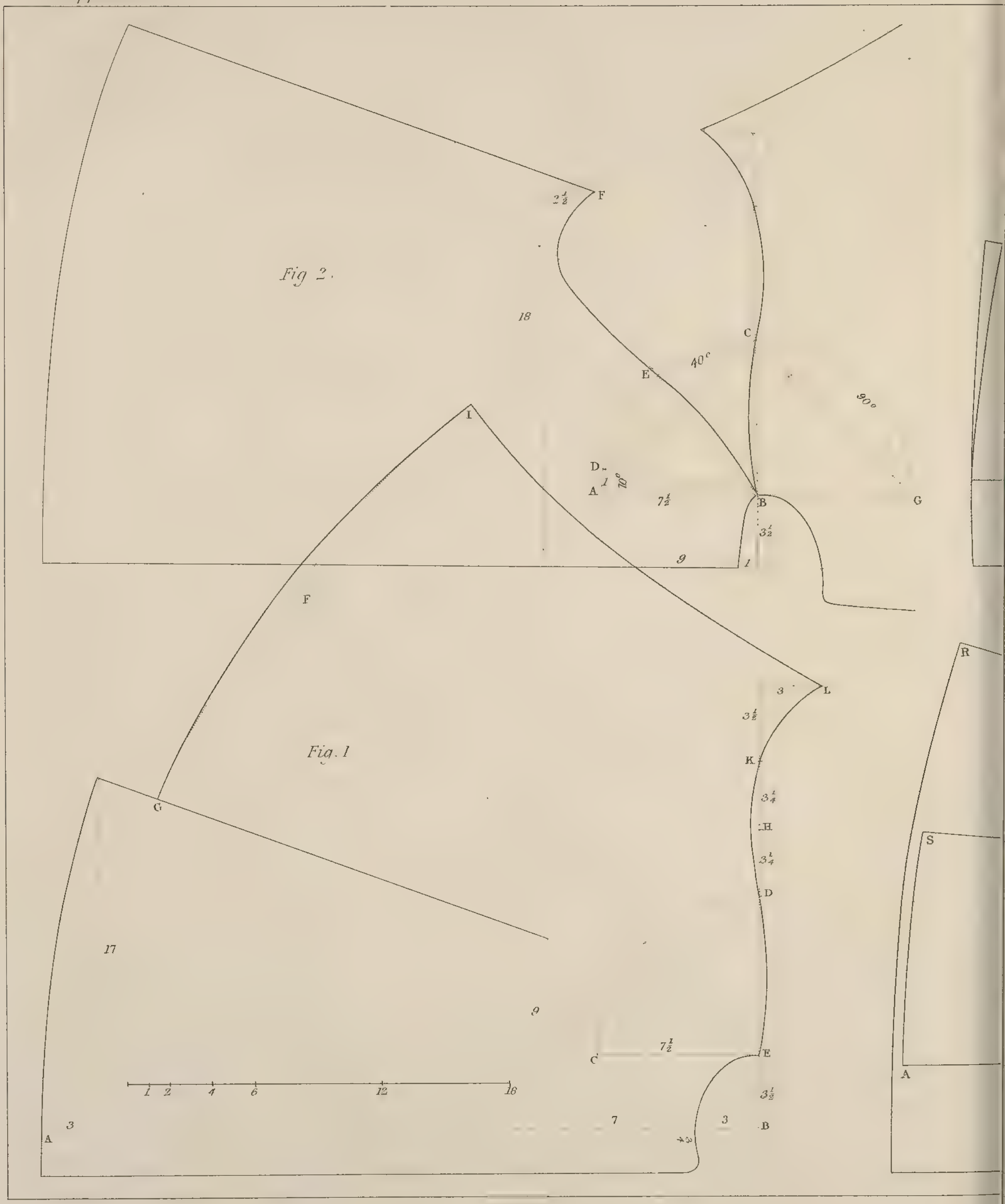

2½
F
18
C
40°
E
90°
D
A
1
10°
7½
B
G
3½
9
1
I
F
L
3
3½
K
3¼
H
3¼
D
G
17
9
C
7½
E
1
2
4
6
12
18
3½
A
3
7
4 3
3
B
R
S
A

Fig 2.

Fig. 1

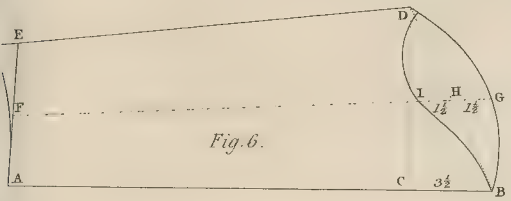


Fig. 6.

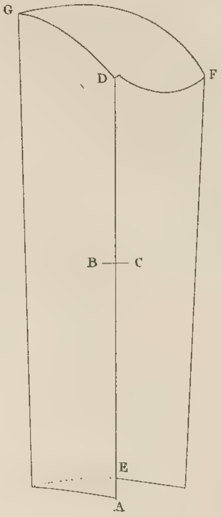


Fig. 7.

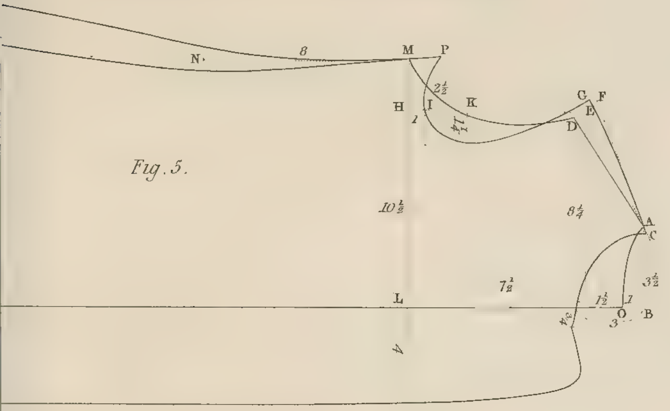


Fig. 5.

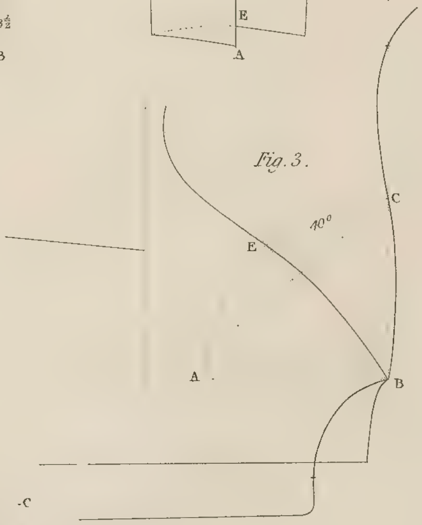


Fig. 3.

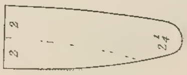


Fig. 8.

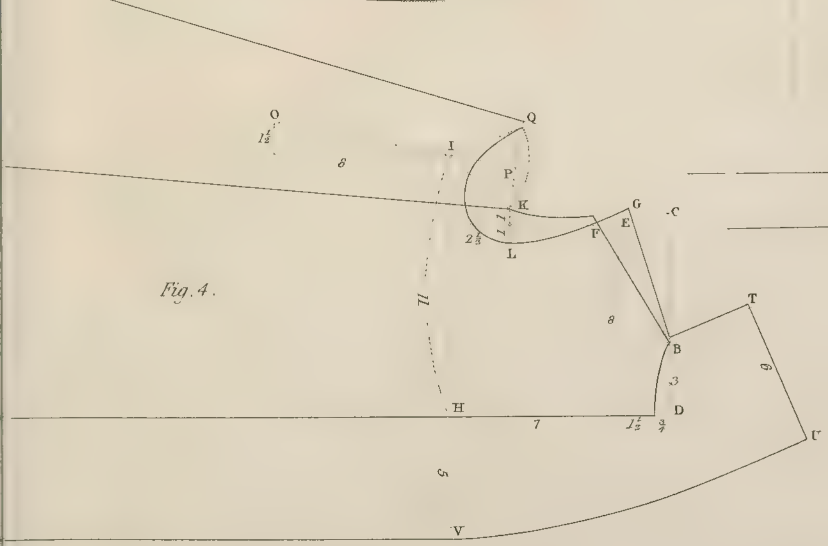


Fig. 4.

J.W Lowry fc.

Pl. 4. Appendix.

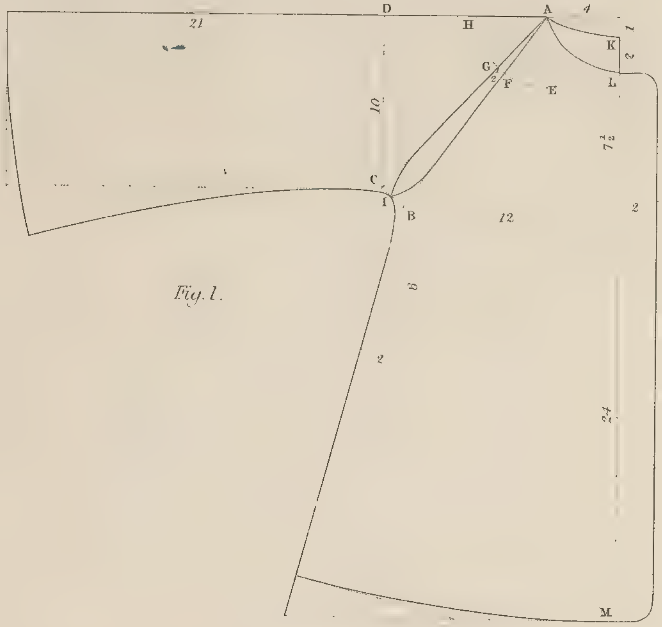


Fig. 1.

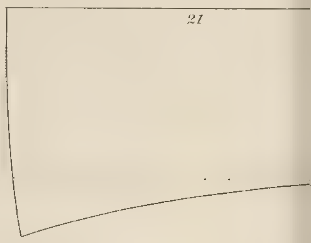


Fig. 2.

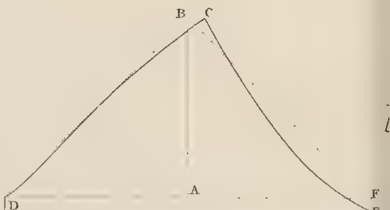


Fig 7.

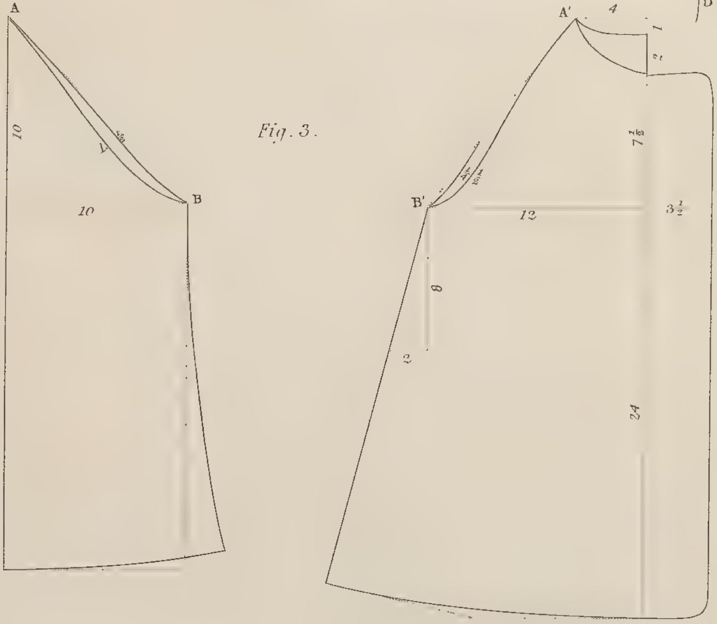
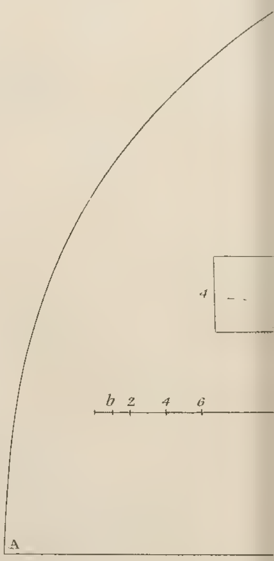
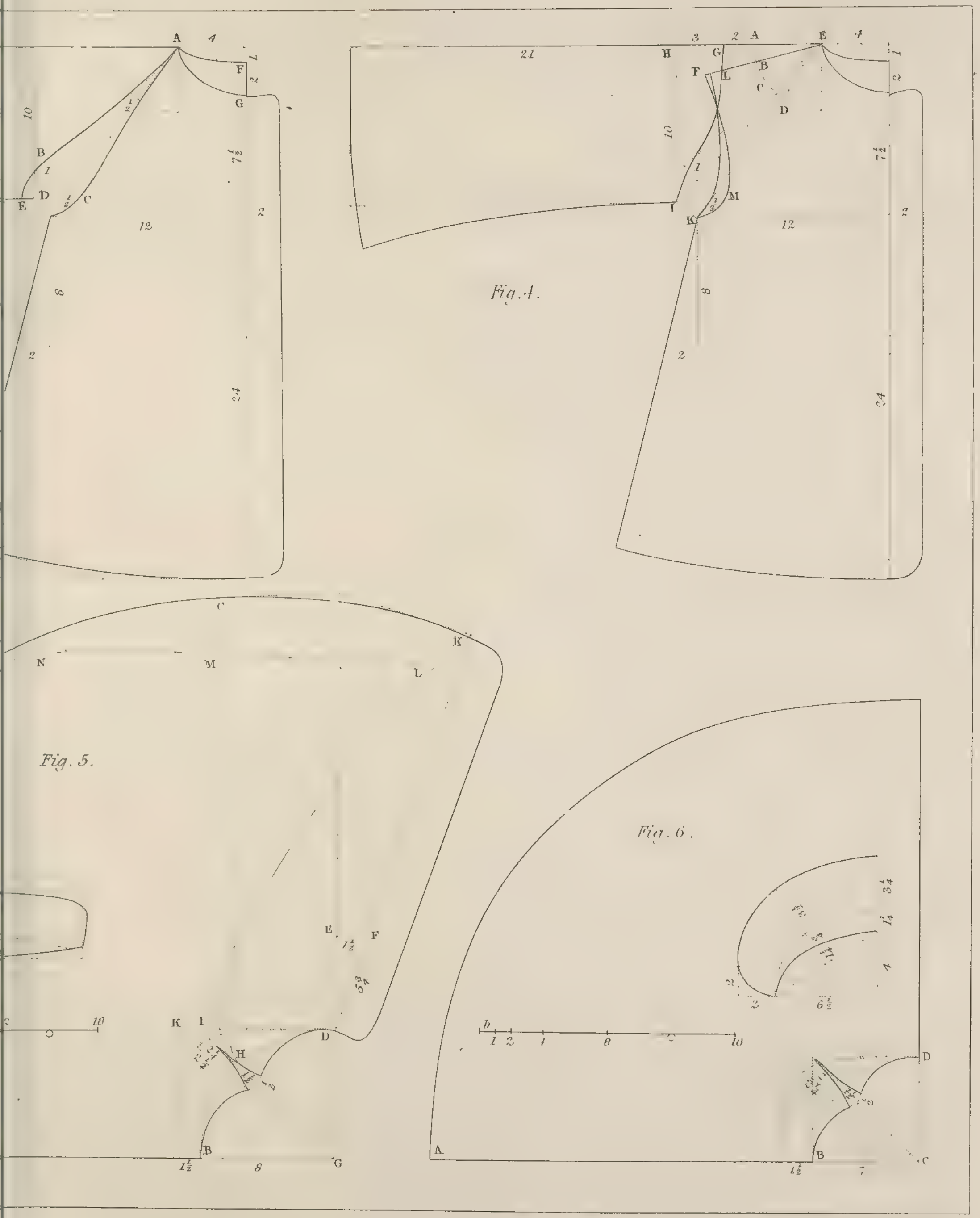


Fig. 3.




A
4
F
G
10
B
1
E
D
C
12
8
2
24
3
2
A
E
21
H
G
F
L
B
C
D
10
1
M
K
12
8
2
24
Fig. 4.
C
K
N
M
L
Fig. 5.
E
F
18
K
I
H
D
B
G
8
Fig. 6.
b
1
2
4
8
10
D
A.
B
C
7

J.W Lowry fc

Plate V. Appendix

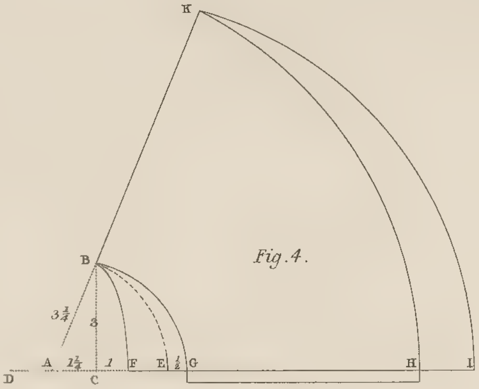


Fig. 4.

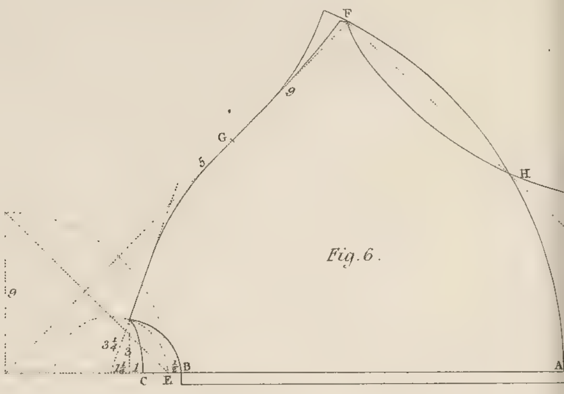


Fig. 6.

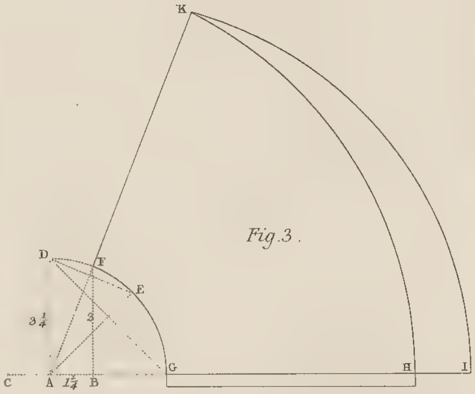


Fig. 3.

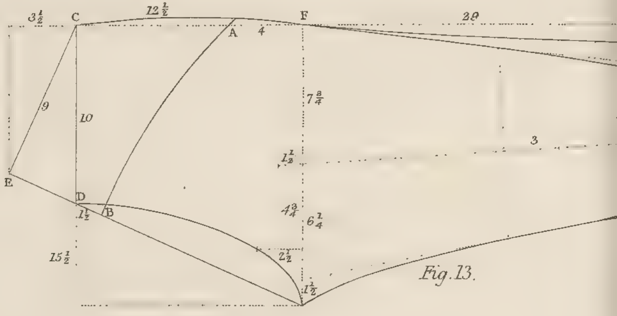
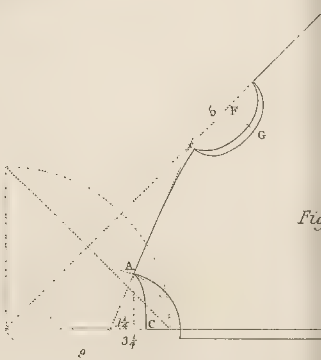
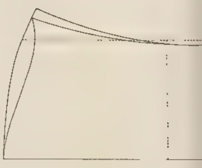


Fig. 13.



Fi



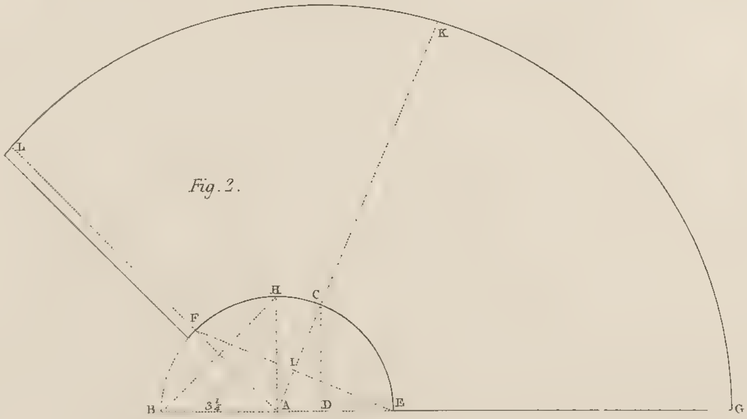


Fig. 2.

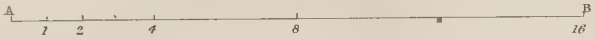
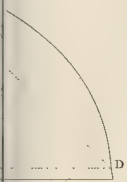
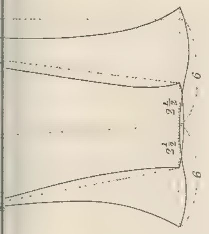


Fig. 1.





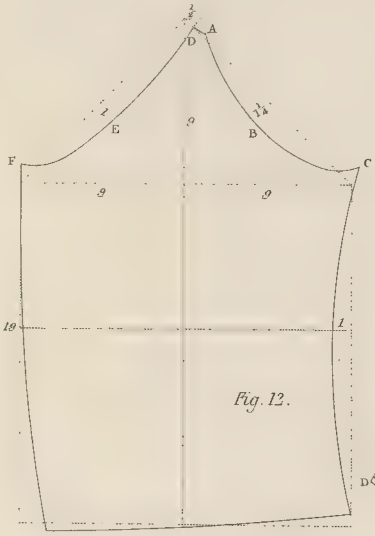


Fig. 12.

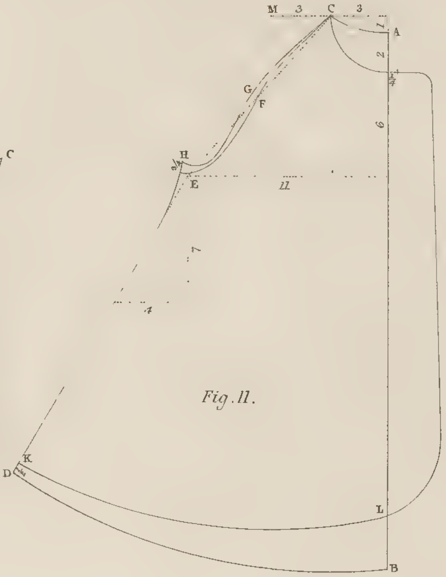


Fig. 11.

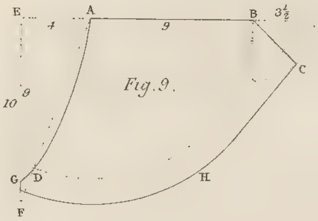


Fig. 9.

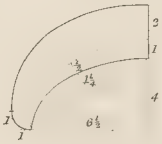


Fig. 10.

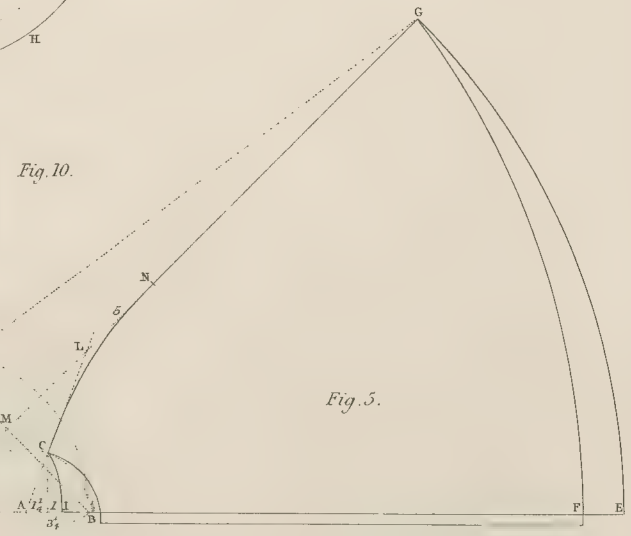


Fig. 5.

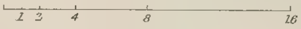


Fig. 14.

J. W. Lowry fc.

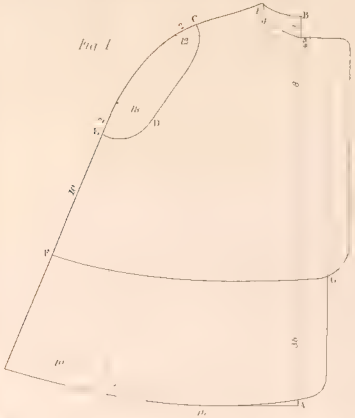


Fig 1

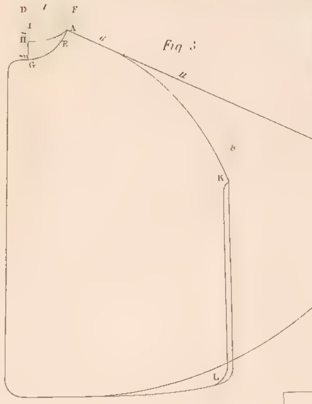


Fig 3

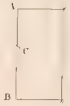


Fig 4

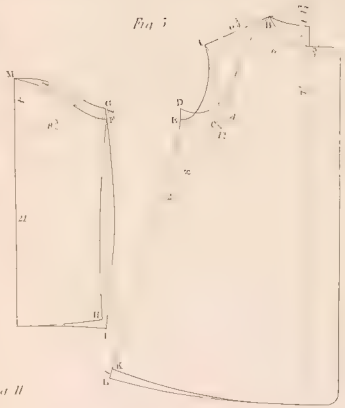


Fig 5

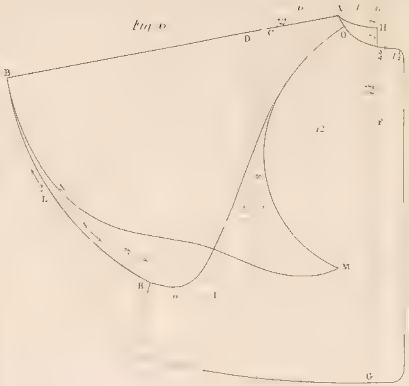


Fig 6

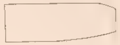


Fig 11

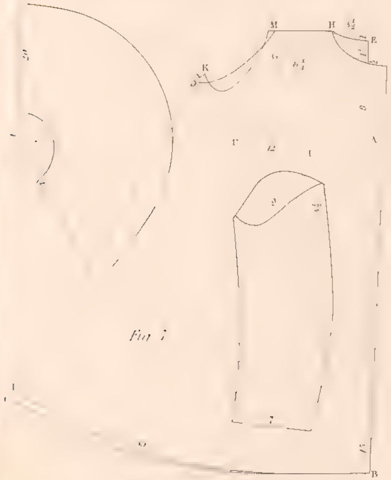
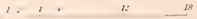


Fig 7

Fig 2



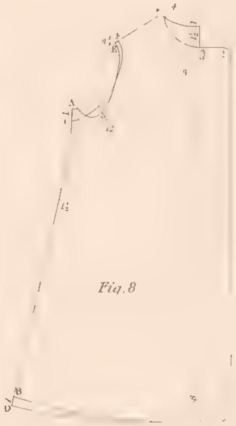


Fig. 8

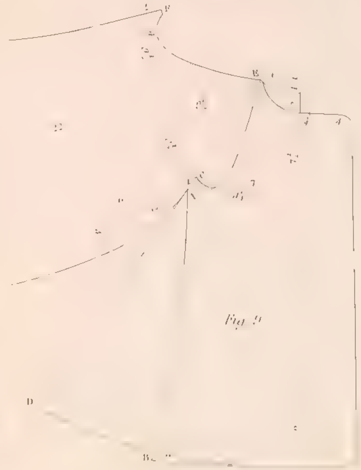


Fig 9

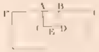


Fig 12

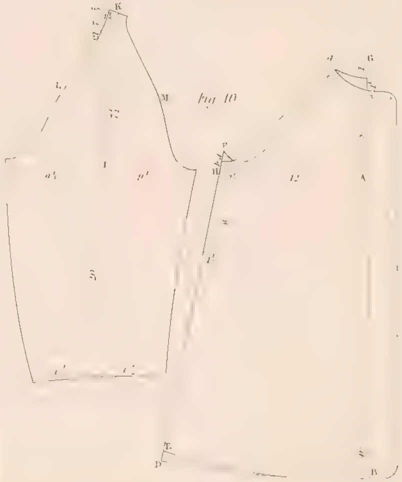


Fig 10

Plate 7 _ Appendix.

Fig. 1.

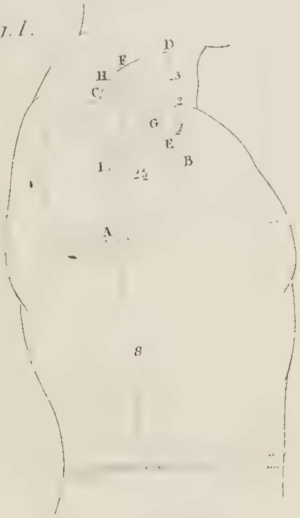


Fig 2.

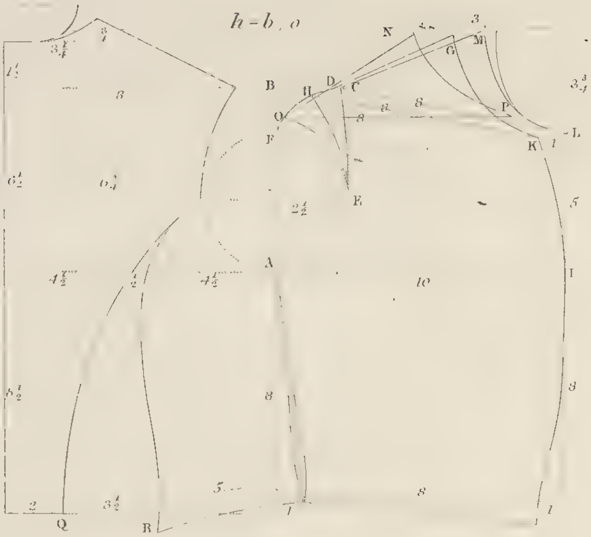


Fig. 3

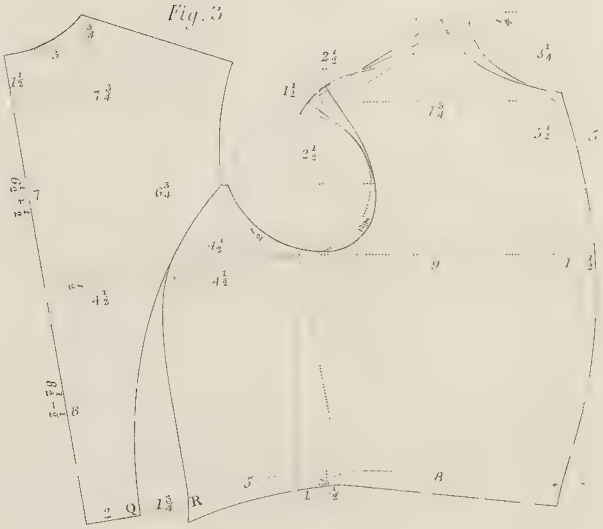
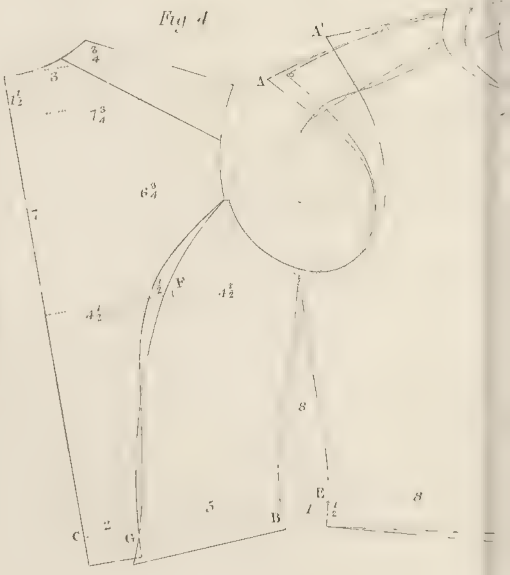
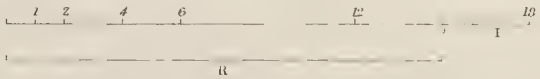


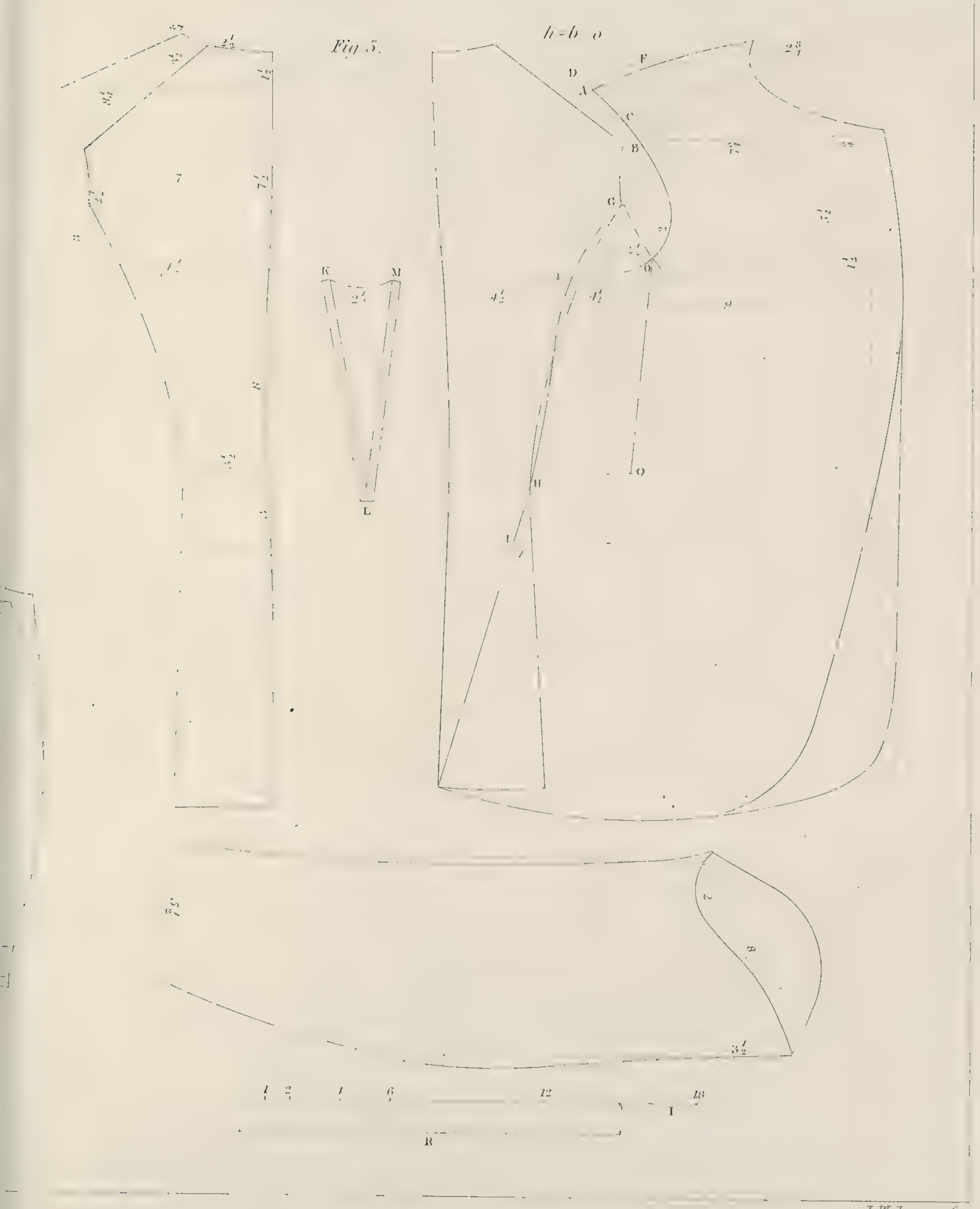
Fig 4





Wampen's Models.

Fig. 5.



J.W. Lowry fc

2021-B420